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Comparative and Forecast Analysis of Research Productivity among Philippine State Universities: A SciVal-Based Bibliometric Assessment (2015–2025)

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Abstract

Research productivity shapes how state universities compete for funding, talent, and global visibility, yet Philippine higher education still lacks a national, indicator-based picture of where that productivity stands and where it is heading. This study addresses that gap through a comparative bibliometric assessment of Philippine State Universities and Colleges (SUCs) using Scopus-indexed data retrieved through Elsevier SciVal for 2015–2025, combined with a five-year forecast (2026–2030) built on Holt's damped linear trend model. The analysis covers three core indicators, Scholarly Output, Citation Count, and Field-Weighted Citation Impact, aggregated across 17 Philippine regions and tested with the Kruskal-Wallis H test, Durbin-Conover post hoc comparisons, and epsilon-squared effect sizes. Results show a decade-long rise in publication output across nearly every region, led consistently by Region III (Central Luzon), which produced 1,952 cumulative publications and 14,365 citations, the highest totals nationwide. Regional differences in both publication output and citation impact are statistically significant across every

period tested ($p < .001$), and the forecast indicates that this gap will persist through 2030 rather than close on its own. Citation performance, unlike publication counts, fluctuates sharply across periods, a pattern consistent with citation lag rather than declining research quality. These findings indicate that Philippine research policy has succeeded in raising publication volume nationally but has not yet closed the gap between leading and lagging regions, and that closing it will require capacity-building investment targeted at specific institutions rather than uniform, system-wide incentives.

Keywords: research productivity; bibliometric analysis; SciVal; Scopus; Philippine state universities and colleges; time series forecasting; regional disparity

1. INTRODUCTION

Research productivity now functions as a core measure of institutional competitiveness, innovation capacity, and global academic visibility (Ryazanova & Jaškiene, 2022; Ocampo et al., 2022; Niemczyk, 2020). Universities are judged on more than their publication counts. Funders, rankers, and policymakers scrutinize research output, international collaboration, and institutional influence, and these judgments carry real consequences for rankings and funding access (Bornmann & Leydesdorff, 2014; Waltman, 2016). Research productivity has, as a result, become one of the defining performance indicators in higher education systems worldwide.

That scrutiny has pushed bibliometric indicators into the center of research evaluation. Analytics platforms built on large academic databases, Scopus foremost among them, now measure output, citation impact, and collaboration across institutions and countries at scale. Elsevier SciVal turns that raw data into standardized indicators, Scholarly Output, Citation Count, Citations per Publication, Field-Weighted Citation Impact (FWCI), and Top Percentile Outputs, that institutions and governments use for benchmarking, research management, and policy design (Elsevier, 2023). These indicators let institutions be compared fairly across disciplines with very different publication and citation norms.

Philippine higher education faces this same pressure, and cannot set it aside. State Universities and Colleges (SUCs) carry four statutory functions, instruction, research, extension, and production, codified in the Higher Education Act of 1994 (Republic Act No. 7722) and reinforced through subsequent Commission on Higher Education (CHED) policy (CHED, 2014). As publicly funded institutions answerable to the taxpayers who support them, SUCs are expected to generate knowledge that feeds national innovation, supports socioeconomic development, and informs public policy. The government has responded with programs meant to build research capacity and expand international publication among Philippine universities.

The results of those programs, however, remain uneven. Bibliometric evidence shows that a small number of universities account for more than half of the country's internationally indexed publications and citations, while most institutions contribute comparatively little (Gopez et al., 2024; Lunag et al., 2023). Researchers trace this imbalance to differences in institutional resources, research culture, faculty quality, and access to research infrastructure (Ambong et al., 2020; Rogayan & Corpuz, 2022; Suson et al., 2020). Faculty characteristics (Hipolito & Santos, 2025; Amanonce et al., 2025), incentive structures (Launio et al., 2024), and research self-efficacy

(Quimbo & Sulabo, 2014) each shape how much individual faculty members publish, compounding these institutional gaps.

These studies advance the field, but three gaps remain. First, most existing work examines single institutions or localized case studies, which limits how far any conclusion can generalize across the national system (Ambong et al., 2020; Rogayan & Corpuz, 2022). A systematic review by Alcazaren (2021) reaches the same conclusion: Philippine research productivity studies remain fragmented across individual institutions rather than integrated into a national evidence base. Second, few studies draw on standardized bibliometric indicators from international databases to compare regions, institutions, or research areas directly (Gopez et al., 2024). Third, the literature leans almost entirely retrospective. Few studies attempt to forecast where research output is headed, leaving institutions and policymakers to plan without a forward-looking evidence base.

This study addresses all three gaps directly. It conducts a comparative bibliometric assessment of research productivity among Philippine SUCs using SciVal indicators for 2015–2025, then extends that assessment with a five-year forecast for 2027–2031. The analysis examines Scholarly Output, Citation Count, Citations per Publication, Field-Weighted Citation Impact, and Top 10% citation percentile outputs to assess regional differences in institutional research performance, and applies time series forecasting to project future productivity trends across SUC regions.

The contribution is threefold. First, it delivers a national-level comparison of research production across every Philippine SUC using internationally standardized measures, something no prior study has done at this scale. Second, it identifies where regional research capacity is strongest and where it lags, information that current policy discussions largely lack. Third, its forecast component gives institutional planners and national policymakers evidence to act on before gaps widen further, rather than data that only describes what already happened.

1.1 Research Questions

RQ1. What is the level of research productivity of Philippine State Universities from 2015 to 2025, as measured by SciVal bibliometric indicators (Scholarly Output, Citation Count, and Field-Weighted Citation Impact)?

RQ2. Are there significant differences in research productivity among SUCs when grouped by Philippine region?

RQ3. Which Philippine regions demonstrate the strongest and weakest bibliometric performance during 2015–2025?

RQ4. What are the projected research productivity trends of Philippine SUCs, by region, for the next five years (2027–2031), based on time series forecasting of Scholarly Output?

2. MATERIALS AND METHODS

2.1 Research Design

This study used a quantitative, comparative bibliometric design with a forecasting component to examine research productivity among Philippine State Universities and Colleges (SUCs). Bibliometric analysis is a well-established method for evaluating scholarly performance through publication and citation indicators drawn from large academic databases (Bornmann & Leydesdorff, 2014; Waltman, 2016).

The design combines two components: a comparative analysis that measures differences in research productivity across regions and time periods, and a time series forecast that projects future productivity trends. Together they support both a retrospective evaluation of what has already happened and a forward-looking projection of what comes next, in line with how institutional benchmarking and policy planning already use research analytics.

2.2 Population and Data Sources

The study covers Philippine higher education institutions indexed in Scopus and tracked in Elsevier SciVal, supplemented by a forecasting dataset of 52 Philippine HEIs with longitudinal records from 2017 to 2025. It draws on two primary data sources: SciVal (Elsevier), for the bibliometric indicators used in the regional comparative analysis (2017–2026), and a master productivity dataset compiled for time series forecasting (2015–2025 historical data). Institutions were classified by CHED regional groupings to enable region-based comparison.

2.3 Measures and Operationalization of Variables

Research productivity was operationalized through three core bibliometric indicators consistent with established scientometric practice: Scholarly Output (SO), the total number of publications; Citation Count (C), the total number of citations received; and Field-Weighted Citation Impact (FWCI), a normalized measure of citation impact relative to the global average for similar publications. An FWCI above 1.00 indicates above-average citation performance relative to that global benchmark (Elsevier, 2023).

For inferential analysis, productivity indicators were grouped into three temporal periods: pre-pandemic (2015–2019), during the pandemic (2020–2022), and post-pandemic (2023–2025). This grouping makes it possible to examine whether the COVID-19 period produced a structural shift in research productivity.

2.4 Data Extraction Procedure

Bibliometric data were extracted from the SciVal Benchmarking module with the following parameters: a 2015–2026 timeframe, all subject areas, and the metrics Scholarly Output, Citation Count, Citations per Publication, FWCI, and Top 10% publications. Data were exported in CSV format and aggregated at the institutional and regional levels. For forecasting, annual data from 2015 to 2025 were compiled for each institution across the selected indicators.

2.5 Statistical Analysis

2.5.1 Descriptive analysis

Descriptive statistics, mean, median, interquartile range (IQR), and range, summarized the distribution of research productivity across regions and time periods and characterized central tendency, dispersion, and skewness in research output.

2.5.2 Inferential analysis

Because the bibliometric data were non-normally distributed with unequal group sizes, the analysis relied on non-parametric tests throughout. The Kruskal-Wallis H test examined regional differences in research productivity for each period, since it suits comparisons across more than two independent groups when normality assumptions do not hold; epsilon-squared (ε^2) effect sizes accompanied each test to gauge the size of the differences found. The Friedman test, the non-parametric equivalent of repeated-measures ANOVA, assessed within-group differences across periods, and Durbin-Conover pairwise comparisons with adjusted p-values identified which specific periods differed. All tests used a significance level of $\alpha = .05$.

2.6 Forecasting Analysis

2.6.1 Forecasting framework

Time series forecasting used annual data from 2015 to 2025 to project a five-year horizon (2026–2030) across three indicators: Publication Quantity, Citation Quantity, and Field-Weighted Citation Impact.

2.6.2 Primary model: Holt's damped linear trend

The primary forecasting method was Holt's damped linear trend model, a form of exponential smoothing whose trend component gradually decays over time. Within the ETS (Error-Trend-Seasonality) framework, the model is specified as ETS(A,Ad,N): additive error, additive damped trend, no seasonality. A fixed damping parameter ($\varphi = 0.85$) retained 85% of the trend at each step while allowing it to decay progressively, which keeps the forecast from extrapolating linearly into implausible territory and lets it settle toward a long-term equilibrium instead. The model was fitted to institutional time series with at least three non-zero observations, the minimum needed for a reliable trend estimate.

2.6.3 Fallback model: simple moving average (SMA-3)

For institutions with fewer than three non-zero observations, a three-period simple moving average served as a fallback, computing the mean of the last three available observations for datasets too sparse or irregular for trend estimation.

2.6.4 Model justification

Three alternative approaches were considered and set aside. ARIMA models require longer, stationary time series than an 11-year dataset can supply (Box et al., 2016). Prophet is built for high-frequency data with seasonality, a pattern absent from annual bibliometric counts. Linear regression weights every historical observation equally, which understates recent trends. Holt's exponential smoothing, by contrast, weights recent data more heavily while remaining robust on

short series, which makes it well suited to bibliometric forecasting (Hyndman & Athanasopoulos, 2018).

2.6.5 Post-processing of forecasts

Negative forecast values were clipped to zero, since publication and citation counts cannot fall below it. Publication and citation forecasts were rounded to the nearest integer; FWCI values were kept continuous. All forecasting was implemented in Python using the statsmodels library, specifically the Holt function within the tsa.holtwinters module.

2.7 Ethical Considerations

This study used secondary, publicly available bibliometric data and involved no human participants, so it did not require ethical clearance. All data were nonetheless handled according to standard principles of transparency, accuracy, and responsible research reporting.

3. RESULTS AND DISCUSSION

3.1 Regional Trends in Scholarly Output (2015–2025)

Table 1 and Figure 1 present regional trends in Scopus-indexed scholarly output among Philippine SUCs from 2015 to 2025. Publication output rose across nearly every region over the decade, though the pace and scale of that growth varied widely. The rise likely reflects strengthened institutional research policies, increased government investment in research and development, expanded international collaboration, and CHED's continuing push for publication in internationally indexed journals. It also tracks a broader global shift toward research-intensive higher education, where scholarly output now functions as a primary marker of institutional competitiveness (Bornmann & Leydesdorff, 2014; Waltman, 2016).

REGION CODE	REGION	PUBLICATION QUANTITY (Scholarly Output)													
		2015	2016	2017	2018	2019	TOTAL PRE	2020	2021	2022	TOTAL PAN	2023	2024	2025	TOTAL POST
BARMM	BARMM	3	3	1	0	7	14	12	8	13	33	39	67	104	210
CAR	CAR	4	11	10	14	23	62	29	32	49	110	74	80	98	252
MIMAROPA	MIMAROPA	13	12	8	11	25	69	23	57	71	151	62	75	81	218
NCR	NCR	7	36	33	53	120	249	112	167	203	482	222	272	284	778
REGION I	ILOCOS REGION 1	6	11	17	42	60	136	71	61	70	202	79	110	169	358
REGION II	CAGAYAN VALLEY	7	19	13	37	136	212	110	96	68	274	92	92	120	304
REGION III	CENTRAL LUZON REGION 3	32	51	49	84	115	331	189	180	222	591	277	355	398	1030
REGION IV-A	CALABARZON	7	11	23	39	73	153	65	77	123	265	153	174	205	532
REGION IX	ZAMBOANGA PENINSULA	5	2	3	8	43	61	38	15	8	61	35	66	63	164
REGION V	BICOL REGION	5	8	12	28	20	73	36	44	47	127	80	82	82	244
REGION VI	WESTERN VISAYAS	5	17	14	21	80	137	33	39	53	125	108	98	114	320
REGION VII	CENTRAL VISAYAS	13	11	9	28	69	130	95	121	140	356	140	216	247	603
REGION VIII	EASTERN VISAYAS	48	24	30	47	76	225	79	126	105	310	116	171	266	553
REGION X	NORTHERN MINDANAO	34	38	32	38	56	198	54	86	88	228	107	144	181	432
REGION XI	DAVAO REGION	5	3	7	10	10	35	9	16	28	53	29	38	72	139
REGION XII	SOCKSARGEN	4	7	7	15	19	52	15	37	27	79	47	49	59	155
REGION XIII	CARAGA REGION	43	37	15	14	32	141	51	81	70	202	105	183	186	474

Table 1. Regional Trends in the Scholarly Output of Philippine State Universities and Colleges (SUCs), 2015–2025

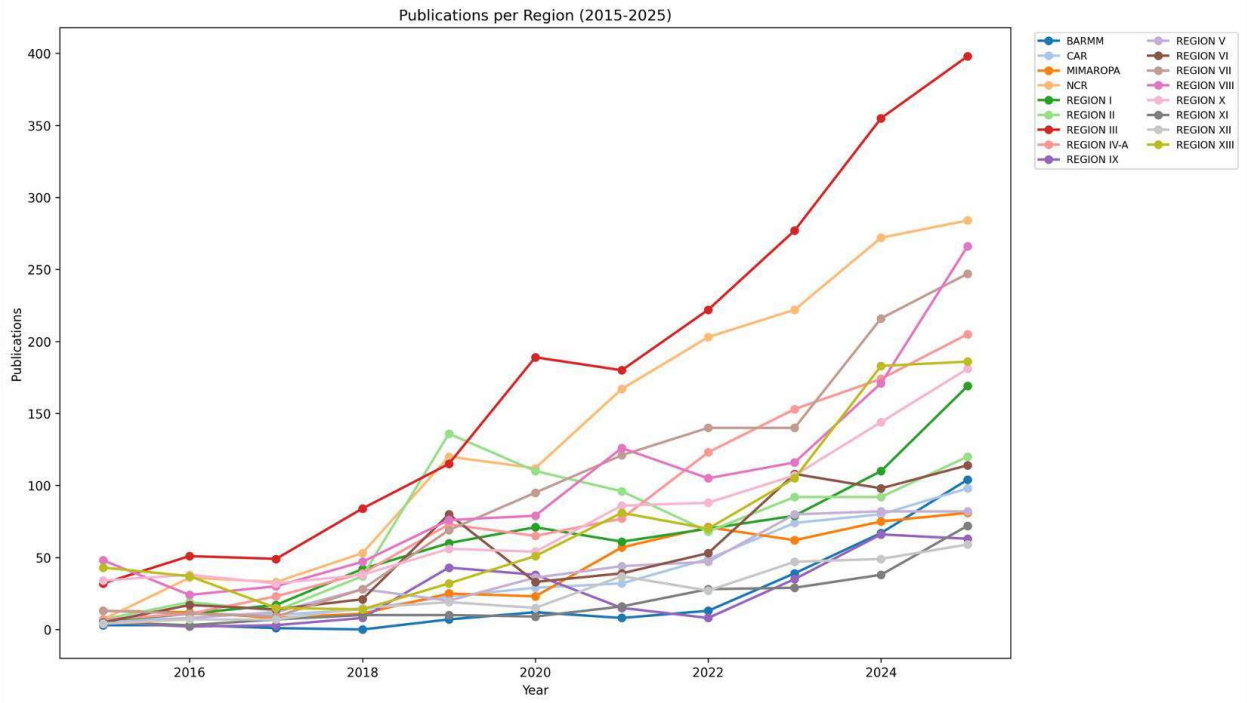


Figure 1. Research Publication of SUCs in Scopus, 2015–2025

Region III (Central Luzon) led every other region in Scopus-indexed publications throughout the period. It recorded just 32 publications in 2015, then grew sharply from 2019 onward, rising from 115 publications in the pre-pandemic period to 591 during the pandemic and 1,030 in the post-pandemic period, for a cumulative total of 1,952. Its growth curve is the steepest of any region, especially after 2022, and it alone produced nearly 400 publications in 2025. That trajectory points to a mature research ecosystem: research-intensive state universities, stronger institutional funding, and an established publication culture. Institutions with these traits, strong infrastructure, effective leadership, comprehensive faculty development, consistently show higher research productivity in the literature (Ryazanova & Jaškiene, 2022; Ocampo et al., 2022).

The National Capital Region (NCR) ranked second with 1,509 total publications, followed by Region VII (Central Visayas) with 1,089, Region VIII (Eastern Visayas) with 1,088, and Region VI (Western Visayas) with 1,054. Each grew steadily across the eleven-year period. NCR sustained high output before the pandemic and kept expanding afterward, a pattern consistent with its concentration of established state universities and research networks. CALABARZON posted one of the fastest post-pandemic accelerations of any region, climbing from 265 publications during the pandemic to 532 afterward, growth that plausibly reflects new institutional research incentives and international publication initiatives. Elsevier (2023) similarly finds that institutions active in international collaboration and publication incentive programs tend to raise their Scopus-indexed output faster than those that are not.

A second tier of regions grew more modestly but consistently. Region X (Northern Mindanao) accumulated 858 publications, Region XIII (Caraga) 817, and Region V (Bicol Region) 444. None matched the country's leading hubs, but each showed continuous improvement, particularly after 2022, evidence that research productivity is spreading geographically rather than staying locked into a handful of traditional centers. Recent bibliometric work reports the same

pattern: emerging regional universities strengthening research capacity through faculty development, graduate education expansion, and greater participation in externally funded projects (Gopez et al., 2024; Lunag et al., 2023).

At the other end, several regions posted modest output throughout. Region XI (Davao Region) recorded the lowest cumulative total, just 227 publications, followed by Region II (Cagayan Valley) with 790, Region I (Ilocos Region) with 696, BARMM with 257, and Region XII (SOCCSKSARGEN) with 286. These regions still grew gradually, especially after the pandemic, which suggests continued if constrained progress rather than stagnation. The literature points to research funding, faculty qualifications, laboratory infrastructure, graduate program availability, institutional research culture, and access to international collaboration as the drivers behind these gaps (Ambong et al., 2020; Rogayan & Corpuz, 2022; Suson et al., 2020). Their slower growth underscores how uneven research development across Philippine higher education remains.

A clear temporal pattern also emerges across the three periods. Most regions posted modest output pre-pandemic (2015–2019), moderate growth during the pandemic (2020–2022), and their highest totals post-pandemic (2023–2025). That sequence looks counterintuitive given how disruptive COVID-19 was to research generally, but it likely reflects timing: publications appearing during the pandemic were largely projects already underway before it began, while the post-pandemic surge reflects renewed activity, expanded digital collaboration, virtual conferences, and a sharper institutional focus on international publication once pandemic restrictions eased. International research shows a similar resilience-then-acceleration pattern following pandemic disruption (Else, 2020; Myers et al., 2020).

3.2 Scholarly Output Forecast (2026–2030)

Table 2 and Figure 2 present the forecasted scholarly output of Philippine SUCs for 2026–2030. The forecast points to continued growth nearly everywhere, suggesting that the momentum built after the pandemic is likely to hold if current research policies, funding, and publication practices stay in place. No region shows a projected decline, which indicates that Philippine higher education has built enough research capacity to sustain output over the long term. This pattern fits what exponential smoothing predicts: models that weight recent observations while tracking long-term trend tend to project continuation rather than reversal, which suits short bibliometric series well (Hyndman & Athanasopoulos, 2018).

Region	FORECASTED PUBLICATION QUANTITY					
	2026	2027	2028	2029	2030	TOTAL
BARMM	135	162	185	204	221	907
CAR	217	247	271	293	310	1338
MIMAROPA	168	174	179	182	184	887
NCR	327	375	416	452	481	2051
REGION I	53	53	54	56	57	273
REGION II	71	76	79	83	85	394
REGION III	452	500	542	578	608	2680
REGION IV-A	226	243	257	268	278	1272
REGION IX	203	217	230	240	249	1139
REGION V	116	125	135	143	149	668
REGION VI	310	350	385	416	441	1902
REGION VII	122	134	144	153	161	714
REGION VIII	316	329	336	343	350	1674
REGION X	219	262	299	330	357	1467
REGION XI	9	9	9	9	10	46
REGION XII	56	70	82	92	100	400
REGION XIII	37	38	39	40	41	195

Table 2. Research Publication Forecast, 2026–2030

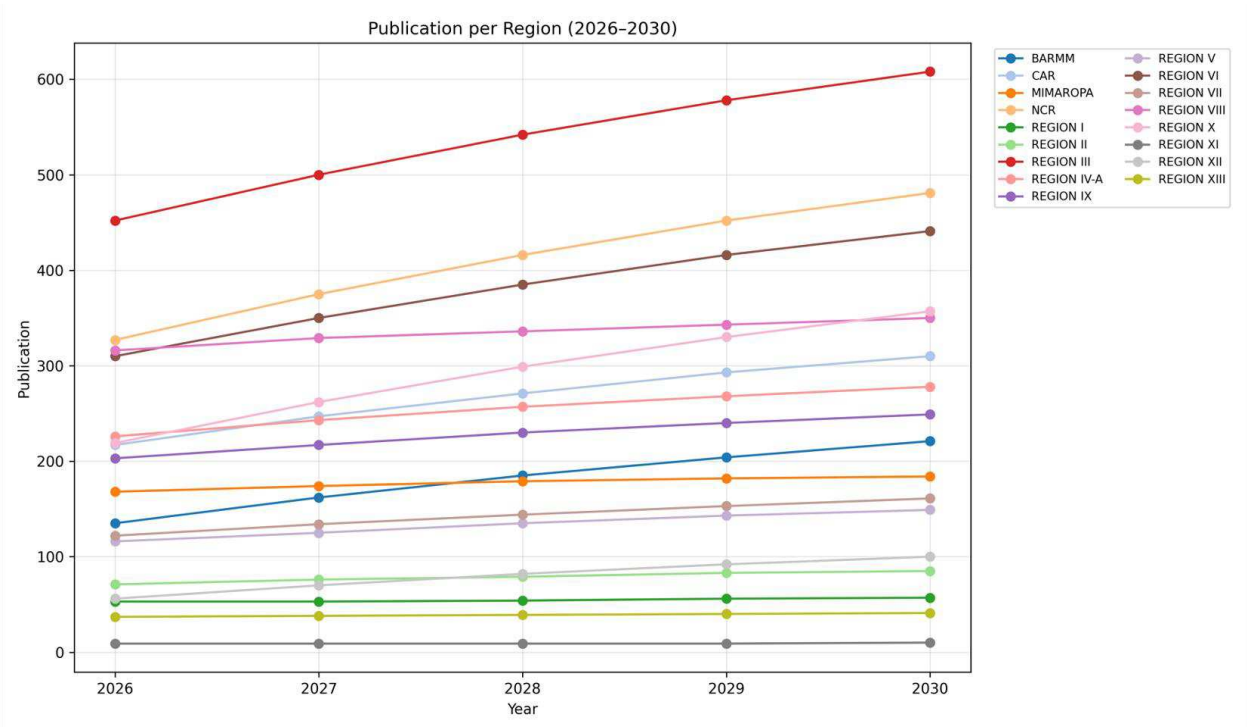


Figure 2. Research Publication Forecast, 2026–2030

Region III (Central Luzon) is projected to remain the country's leading producer throughout the forecast period, rising from 452 publications in 2026 to 608 in 2030 for a cumulative 2,680, the highest of any region. That steady climb is consistent with its historical trajectory and points to a research ecosystem capable of sustaining continuous growth: concentrated research-intensive universities, mature graduate programs, strong research governance, and deep national and international collaboration. Institutions with that combination of traits sustain long-term publication growth more reliably than those with newer research systems (Bornmann & Leydesdorff, 2014; Ryazanova & Jaškiene, 2022).

NCR is forecast to remain a leading hub as well, growing from 327 publications in 2026 to 481 by 2030, a cumulative 2,051. Region VI (Western Visayas) is projected to reach 1,902, Region VIII (Eastern Visayas) 1,674, Region X (Northern Mindanao) 1,467, CAR 1,338, and Region IV-A (CALABARZON) 1,272. These regions show steep, steady year-on-year growth rather than sharp swings, evidence of stable institutional research systems that have moved from moderate producers to increasingly competitive contributors nationally. Elsevier (2023) attributes this kind of sustained growth to cumulative investment in faculty productivity, publication incentives, graduate education, and collaborative networks.

A middle tier of regions is forecast to grow steadily but from a lower base: Region IX (Zamboanga Peninsula) is projected to reach 1,139 publications, BARMM 907, MIMAROPA 887, Region VII (Central Visayas) 714, Region V (Bicol Region) 668, Region XII (SOCCSKSARGEN) 400, and Region II (Cagayan Valley) 394. None approach the leading regions, but all show continuous growth with no sign of stagnation, suggesting that the past decade's research development initiatives are paying off more broadly. Recent analyses of Philippine higher education report the same broadening: regional universities strengthening research capacity through faculty development, external funding, and collaborative research (Gopez et al., 2024; Lunag et al., 2023).

Region XI (Davao Region) and Region XIII (Caraga) are forecast to remain the least productive regions. Region XI is projected to produce only 46 publications across the entire five-year horizon, moving barely from 9 in 2026 to 10 in 2030. Region XIII is expected to generate 195 publications, rising only from 37 to 41. Region I (Ilocos Region) is projected to accumulate just 273, also reflecting slow growth. These near-flat trajectories point to structural constraints, lower funding, fewer doctoral-qualified faculty, limited graduate programs, weaker international ties, and reduced institutional capacity, that the literature consistently identifies as drivers of regional disparity in developing higher education systems (Ambong et al., 2020; Rogayan & Corpuz, 2022; Suson et al., 2020).

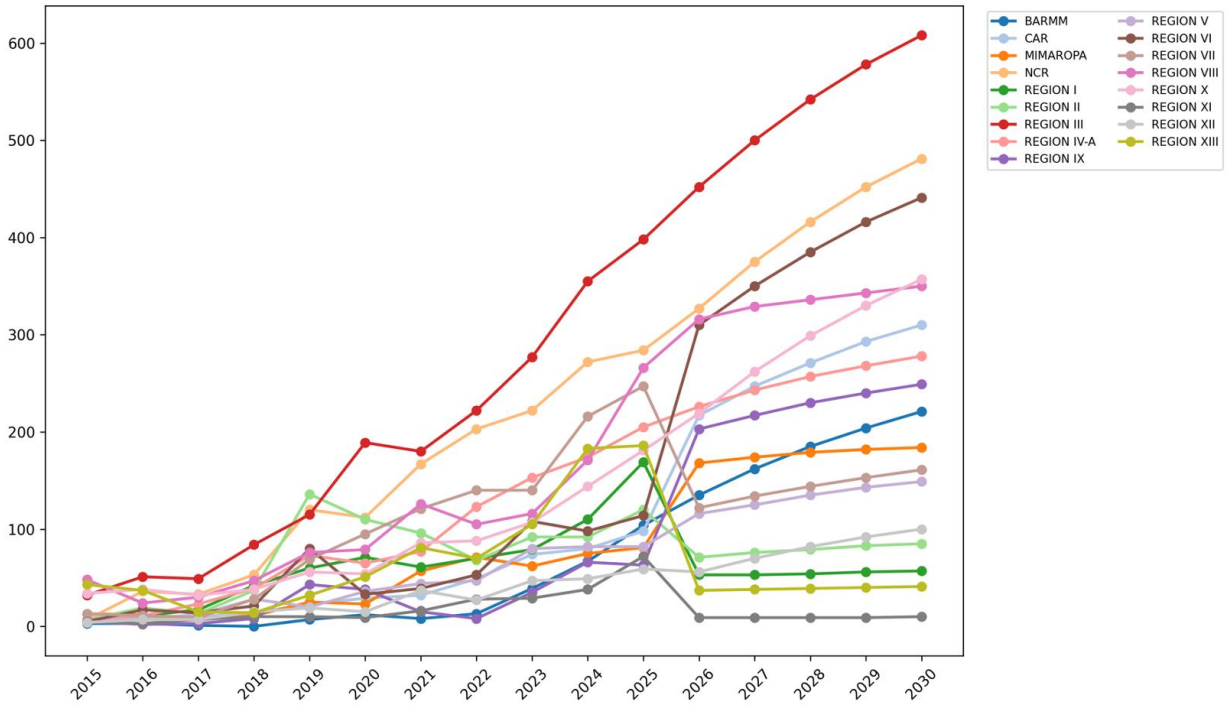


Figure 3. Research Publication Trend, 2015–2030

Figure 3 extends this picture across the full 2015–2030 span. Two patterns stand out. First, nearly every region shows linear or near-linear growth throughout the forecast horizon, meaning the model expects stable expansion rather than sudden acceleration or reversal. Second, relative rankings barely shift: regions that led historically continue to lead throughout the projection. That stability suggests today's gaps in institutional research capacity will persist unless something changes the underlying conditions. This is consistent with how exponential smoothing methods behave generally, preserving established growth patterns while damping long-term trend to avoid implausible extremes (Hyndman & Athanasopoulos, 2018). These trajectories should be read as likely outcomes if current research environments stay roughly as they are, not as certainties.

The policy implication follows directly. Continued investment in research capacity, publication incentives, faculty development, and international collaboration should keep generating gains for most regions. But the persistence of large regional gaps means national research development remains uneven, and without targeted intervention, lower-performing regions risk falling further behind rather than catching up. Sustaining support for high-performing institutions still matters, but national policy should also prioritize capacity-building, infrastructure investment, mentorship, competitive grants, and collaborative networks aimed specifically at emerging regional universities. That kind of balanced investment would build a more equitable national research system and strengthen the country's overall scientific standing (Bornmann & Leydesdorff, 2014; Ocampo et al., 2022; Ryazanova & Jaškiene, 2022).

3.3 Spatial Distribution of Publication Productivity (2015–2030)

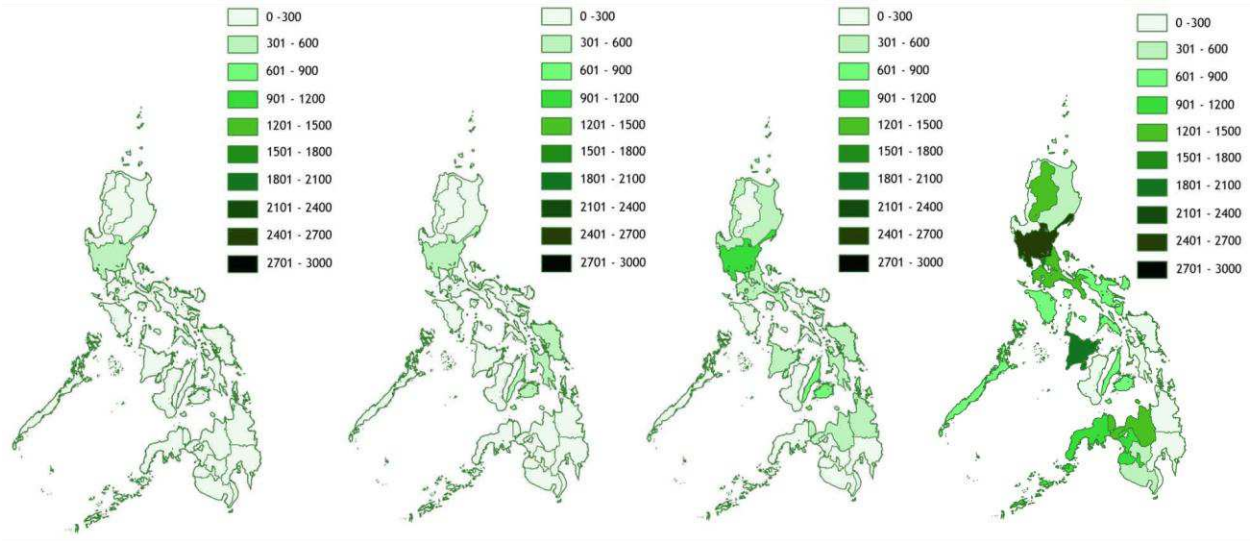


Figure 4. Research Publication Maps, 2015–2030

Figure 4 maps the spatial distribution of publication productivity across four benchmark periods from 2015 to 2030. Darker shading marks higher output; lighter shading marks lower output. The sequence shows productivity expanding nationwide over time, though the distribution stays uneven. As shading intensifies from the historical to the forecast period, output keeps growing across the country, but it remains concentrated in a small set of research-intensive regions, a pattern consistent with how scientific productivity tends to cluster around institutions with stronger infrastructure, funding, and international ties (Bornmann & Leydesdorff, 2014; Waltman, 2016).

The earliest map shows modest, scattered activity, with only a few areas showing moderate output, evidence that international publication among SUCs was still developing early in the study period. Output was concentrated among universities with established graduate programs, experienced researchers, and stronger institutional research cultures, consistent with the historical disparities documented elsewhere in Philippine higher education (Ambong et al., 2020; Rogayan & Corpuz, 2022).

The subsequent maps show that expansion, not confined to traditional centers, reaching previously less productive regions as well. That shift reflects sustained investment in faculty capability, government support for research and innovation, expanded graduate education, and a stronger institutional push toward internationally indexed publication, alongside CHED initiatives such as faculty scholarships, research grants, internationalization programs, and performance-based incentives. Systematic investment of this kind measurably raises institutional innovation potential and scholarly output (Ocampo et al., 2022).

The 2026–2030 forecast map shows Region III (Central Luzon) in the darkest classification of any region, consistent with its projected lead in cumulative output. Rising intensity in neighboring regions, NCR, Western Visayas, Eastern Visayas, Northern Mindanao, and CALABARZON, points to multiple regional research hubs capable of sustaining high publication levels, evidence that Philippine research capacity is maturing beyond a single metropolitan center. Recent bibliometric work reports the same trend: regional state universities substantially

strengthening international publication performance over the past decade (Gopez et al., 2024; Lunag et al., 2023).

That improvement, though, does not erase regional inequality. Several regions stay in the lighter shading categories across both historical and forecast periods, evidence of structural barriers that remain unresolved. Prior work attributes these gaps to institutional funding, doctoral faculty availability, infrastructure, graduate programs, administrative support, and international collaboration opportunities (Ryazanova & Jaškiene, 2022; Suson et al., 2020). National output is rising, in other words, but the gains are not landing evenly.

The maps also show productivity diffusing beyond the country's traditional academic centers rather than concentrating further. That diffusion likely reflects research decentralization policy, collaborative networks, and capacity-building among regional universities. Scientometric theory attributes this kind of diffusion to institutional collaboration, knowledge exchange, faculty mobility, and expanding partnerships, mechanisms that let emerging universities progressively build scholarly capacity (Bornmann & Leydesdorff, 2014; Wagner & Leydesdorff, 2005). The Philippine research landscape, in short, is becoming more interconnected even as it stays unequal.

3.4 Regional Citation Performance (2015–2025)

REGION CODE	REGION	RESEARCH (PRODUCTIVITY)													
		2015	2016	2017	2018	2019	TOTAL PRE	2020	2021	2022	TOTAL PAN	2023	2024	2025	TOTAL POST
BARMM	BARMM	30	23	7	0	90	150	53	130	285	468	505	233	89	827
CAR	CAR	23	101	45	243	184	596	242	327	252	821	245	192	48	485
MIMAROPA	MIMAROPA	348	215	84	102	161	910	183	699	932	1814	449	138	52	639
NCR	NCR	36	362	241	425	998	2062	860	926	1124	2910	1090	604	221	1915
REGION I	ILOCOS REGION 1	24	84	199	462	230	999	393	781	369	1543	309	163	81	553
REGION II	CAGAYAN VALLEY	40	454	33	325	428	1280	733	687	447	1867	354	116	77	547
REGION III	CENTRAL LUZON REGION 3	427	510	568	1982	1940	5427	1985	2478	1432	5895	1184	1435	424	3043
REGION IV-A	CALABARZON	95	95	166	342	588	1286	634	888	997	2519	571	502	94	1167
REGION IX	ZAMBOANGA PENINSULA	45	10	7	172	322	556	228	114	86	428	249	397	47	693
REGION V	BICOL REGION	24	29	157	182	78	470	114	316	237	667	308	133	87	528
REGION VI	WESTERN VISAYAS	55	171	131	139	1361	1857	850	732	651	2233	589	222	47	858
REGION VII	CENTRAL VISAYAS	47	68	32	712	787	1646	1167	832	1073	3072	709	675	211	1595
REGION VIII	EASTERN VISAYAS	626	206	987	808	658	3285	1988	1942	1732	5662	591	392	233	1216
REGION X	NORTHERN MINDANAO	123	383	233	707	618	2064	536	671	578	1785	420	191	122	733
REGION XI	DAVAO REGION	92	24	55	59	183	413	31	55	118	204	83	88	26	197
REGION XII	SOCKSARGEN	78	72	90	408	338	986	76	357	215	648	195	215	49	459
REGION XIII	CARAGA REGION	88	379	178	194	336	1175	502	522	362	1386	357	221	45	623

Table 3. Research Citation of SUCs, 2015–2025

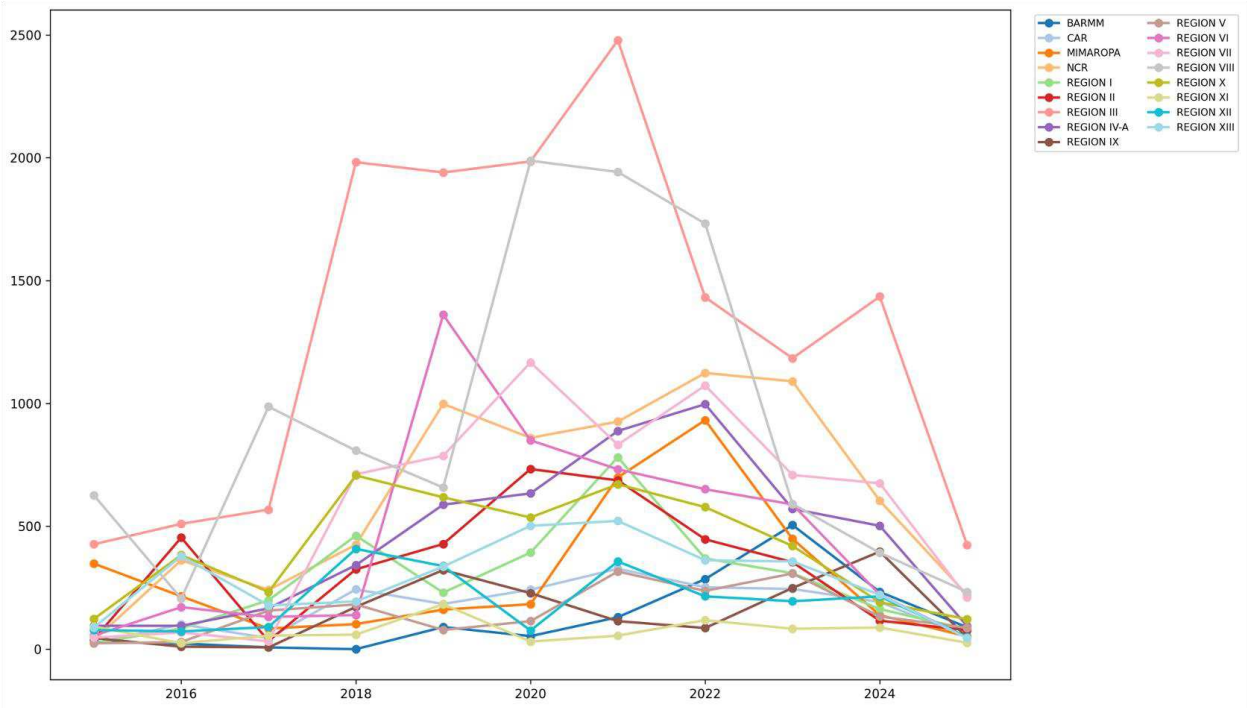


Figure 5. Research Citation of SUCs, 2015–2025

Table 3 and Figure 5 present citation performance among Philippine SUCs from 2015 to 2025. Publication counts measure volume; citations measure influence and visibility within the global scientific community. A published article that goes uncited contributes little to the field's recognition of an institution's work, so citation analysis remains one of the most widely accepted indicators of research quality (Bornmann & Daniel, 2008; Waltman, 2016). The results show substantial variation in citation performance across regions, and that variation does not track publication volume in a simple way: producing more does not guarantee being cited more.

Region III (Central Luzon) again led every other region, accumulating 14,365 citations over the study period. Citations rose from 427 in 2015 to a peak of 2,487 in 2021, then declined gradually, 5,427 pre-pandemic, 5,895 during the pandemic, and 3,043 post-pandemic, still ahead of every other region across all three periods. Its citation lead mirrors its publication lead, meaning its research output is not just abundant but also widely recognized internationally, consistent with a strong research culture, high-impact journal placement, and deep international collaboration. Institutions with well-established research ecosystems consistently produce higher-impact publications because of the visibility, collaboration, and relevance those ecosystems generate (Bornmann & Leydesdorff, 2014; Elsevier, 2023).

Eastern Visayas (Region VIII) ranked second with 10,163 cumulative citations, followed by NCR with 6,887, Central Visayas (Region VII) with 6,313, and CALABARZON (Region IV-A) with 4,972. Each held up despite year-to-year swings. Eastern Visayas is the standout case: it accumulated 5,662 citations during the pandemic, well above its pre-pandemic total of 3,285, before falling to 1,216 post-pandemic. Central Visayas generated 3,072 citations during the pandemic, its highest of any period. Both patterns suggest that research from these regions gained real international visibility during the pandemic years, plausibly because it addressed globally

relevant problems or benefited from expanded international collaboration; internationally co-authored studies typically draw more citations than domestically authored ones, since they reach broader academic networks (Wagner & Leydesdorff, 2005).

Several regions produced meaningful citation impact despite lower publication volumes. Northern Mindanao (Region X) accumulated 4,582 citations, MIMAROPA 3,363, CAR 1,902, and CARAGA (Region XIII) 3,184, each punching above its publication weight. Citation impact depends on more than how many papers a region publishes; journal quality, research novelty, and international accessibility all matter (Bornmann & Daniel, 2008; Moed, 2005). Institutions that prioritize placement in reputable international journals can out-cite regions publishing more but placing less strategically, which is exactly the pattern here.

At the low end, Region XI (Davao Region) recorded the fewest citations of any region, 814, followed by BARMM (1,445), Region V (Bicol Region, 1,665), Region IX (Zamboanga Peninsula, 1,677), CAR (1,902), and Region XII (SOCCSKSARGEN, 2,079). These regions improved modestly over time but stayed well behind the leaders, a gap that likely traces to publication quality, journal visibility, international collaboration, faculty research experience, and institutional support. Philippine studies point to the same drivers, limited research funding, weak infrastructure, and fewer international networking opportunities, behind lower citation impact in many regional universities (Ambong et al., 2020; Rogayan & Corpuz, 2022; Suson et al., 2020).

The temporal pattern for citations differs sharply from publications. While output rose steadily year over year, citation counts swung, peaking during the pandemic (2020–2022) before falling afterward in most regions. Region III peaked at 2,487 citations in 2021; Eastern Visayas at 1,988; Central Visayas at 1,167; CALABARZON at 997, all in the same window. The post-2022 drop should not be read as declining quality. It reflects the citation lifecycle: newer articles simply have not had time to accumulate citations the way older ones have. Publications from 2023–2025 have had far less time to be cited than those from several years earlier, a well-documented phenomenon known as citation lag (Moed, 2005; Bornmann & Daniel, 2008).

Citation trends are visibly more volatile than publication trends. Publication growth traces a smooth upward line; citation counts show sharp peaks and drops across regions, evidence that citation impact tracks specific highly-cited papers, collaborative projects, and emerging topics rather than sheer publication volume. Some regions saw dramatic citation surges in particular years, consistent with a small number of influential or internationally collaborative studies driving most of the increase, further evidence that citation productivity reflects scientific relevance and dissemination as much as output (Bornmann & Leydesdorff, 2014; Waltman, 2016).

Taken together, these findings show that Philippine SUCs have meaningfully raised their international visibility over the past decade, even as regional gaps in citation performance persist. Regions with high publication output also tend to earn the most recognition, while lower-output regions continue to accumulate fewer citations. That pattern argues for pairing publication-focused policy with strategies aimed squarely at research quality, journal placement, international collaboration, and visibility. Investment in high-impact publishing, collaborative networks, open-access dissemination, and faculty research capability would raise both output and citation impact together, strengthening the global standing of Philippine higher education (Elsevier, 2023; Gopez et al., 2024; Ryazanova & Jaškiene, 2022).

3.5 Citation Forecast (2026–2030)

REGION CODE	FORECASTED CITATION QUANTITY					
	2026	2027	2028	2029	2030	TOTAL
BARMM	93	96	99	101	103	492
CAR	472	483	493	501	508	2457
MIMAROPA	428	437	446	452	458	2221
NCR	517	542	562	579	594	2794
REGION I	326	333	338	343	346	1686
REGION II	133	134	135	135	136	673
REGION III	902	912	920	928	936	4598
REGION IV-A	554	568	579	588	596	2885
REGION IX	328	331	333	336	337	1665
REGION V	263	268	273	278	282	1364
REGION VI	645	652	657	662	666	3282
REGION VII	407	423	437	448	457	2172
REGION VIII	620	642	662	680	694	3298
REGION X	847	856	862	868	873	4306
REGION XI	25	26	26	27	27	131
REGION XII	15	15	15	15	15	75
REGION XIII	164	166	168	170	171	839

Table 4. Research Citation Forecast, 2026–2030

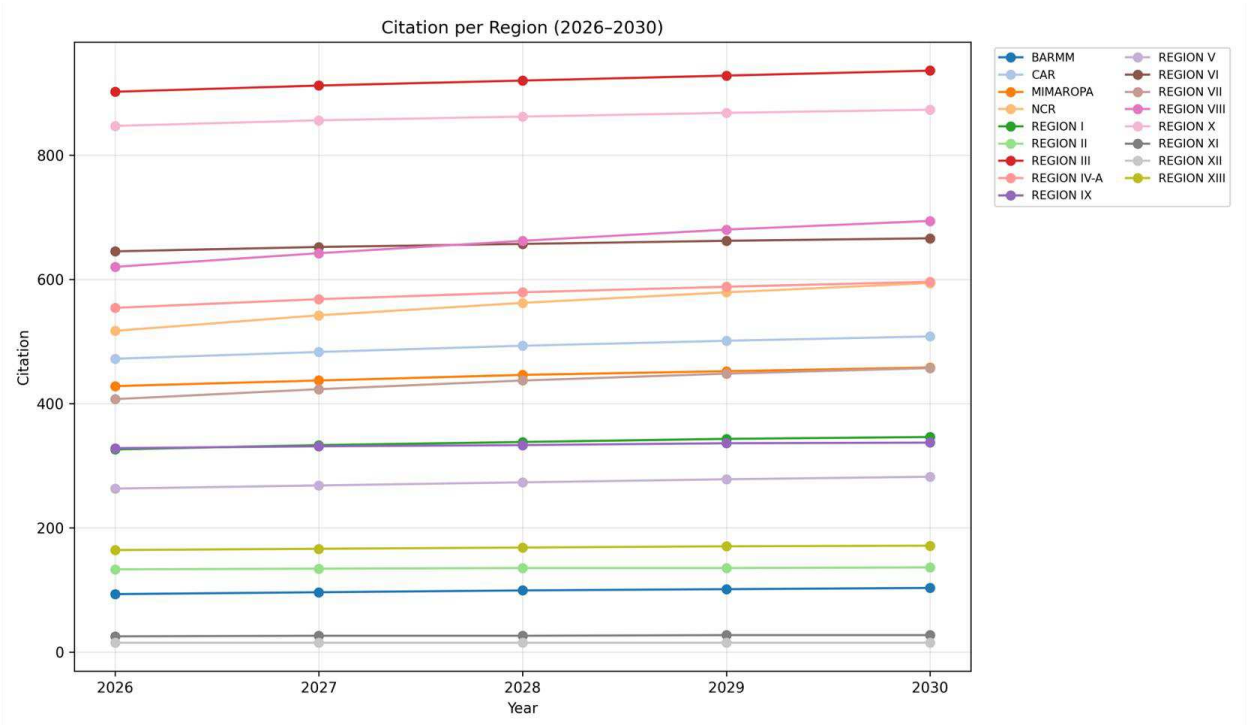


Figure 6. Research Citation Forecast, 2026–2030

Table 4 and Figure 6 present projected citation performance for 2026–2030. The forecast points to relative stability with gradual gains across most regions. Unlike the steeper publication forecasts, citation forecasts rise more slowly, a difference that reflects how citations accumulate: gradually, as articles circulate, get read, and get cited by later work. The scholarly influence of Philippine SUCs should keep strengthening through the forecast period, just at a slower pace than publication growth, consistent with citations functioning as a lagging indicator of scientific impact (Bornmann & Daniel, 2008; Moed, 2005).

Region III (Central Luzon) is projected to remain the country's citation leader, rising from 902 citations in 2026 to 936 in 2030, a cumulative 4,598, the highest nationally. The annual gains are modest compared with its historical swings, but its consistently high level suggests it will hold its international research visibility. That mirrors its historical pattern, leading in both publication and citation simultaneously, evidence that its output is both abundant and consistently used by other researchers. Sustained citation leadership like this typically comes from mature research systems: experienced faculty, high-impact journal placement, deep international collaboration, and strong graduate programs (Bornmann & Leydesdorff, 2014; Elsevier, 2023).

Region X (Northern Mindanao) is forecast to place second in citation impact, rising from 847 citations in 2026 to 873 in 2030 for a cumulative 4,306, notable because it outranks several traditionally stronger regions despite lower publication volume. That gap between rank and volume suggests Northern Mindanao institutions may be producing fewer but more influential papers, since citation performance depends on journal quality, novelty, and accessibility as much as sheer count (Bornmann & Daniel, 2008; Waltman, 2016).

Other regions projected to sustain strong citation performance include Eastern Visayas (3,298 cumulative citations), Western Visayas (3,282), CALABARZON (2,885), and NCR (2,794). Each shows steady upward movement rather than sharp swings, evidence of research systems mature enough to hold international visibility over time. Elsevier (2023) links this kind of long-term citation growth to established research management systems that support both output quality and dissemination.

A middle tier is forecast to grow moderately: CAR to 2,457 citations, MIMAROPA to 2,221, Central Visayas to 2,172, Ilocos Region to 1,686, Zamboanga Peninsula to 1,665, and Bicol Region to 1,364. None reach the top tier, but all trend upward without decline, evidence that research from these regions should keep gaining visibility as publication quality and dissemination continue to improve. Recent studies of Philippine higher education report the same broadening of research influence through expanded collaboration and faculty development (Gopez et al., 2024; Lunag et al., 2023).

SOCCSKSARGEN (Region XII) and Davao Region (Region XI) are projected to remain the lowest citation performers. Region XII is forecast to accumulate just 75 citations, holding flat at 15 per year throughout. Region XI is projected to reach 131 citations, moving only from 25 to 27. BARMM is expected to produce 492, Cagayan Valley 673, and CARAGA 839. These near-flat trajectories suggest limited international visibility ahead even if publication activity continues, consistent with the literature's account of limited infrastructure, weak international ties, and thin

dissemination mechanisms driving lower citation performance (Ambong et al., 2020; Ryazanova & Jaškiene, 2022; Suson et al., 2020).

The forecast curves are markedly smoother than the historical record, which swung sharply on the strength of individual highly-cited papers and shifting citation lifecycles. That smoothness reflects the forecasting model itself, which dampens short-term volatility to emphasize the underlying trend (Hyndman & Athanasopoulos, 2018). These projected trajectories are best read as expected long-term tendencies, not precise annual counts.

Regional rankings in the forecast barely move from the historical pattern: today's leaders keep leading, and today's laggards show only modest gains. That stability implies today's gaps in research capacity, publication quality, and international visibility will persist absent real policy intervention, and the gap between leading and developing institutions could widen further without one. International scientometric research documents the same dynamic, established institutions holding cumulative advantages in citation impact through stronger networks, funding, and reputation, an effect Merton (1968) termed the Matthew Effect in science.

Overall, the forecast points to continued growth in Philippine SUCs' scholarly influence through 2030, but it also makes clear that publication volume alone will not deliver more impact. Future research strategy needs to target quality, international collaboration, high-impact journal placement, open-access dissemination, and citation visibility alongside output. Strengthening productivity and influence together would put Philippine higher education in a stronger position globally and raise its contribution to international knowledge production (Elsevier, 2023; Ocampo et al., 2022; Waltman, 2016).

3.6 Citation Trend (2015–2030)

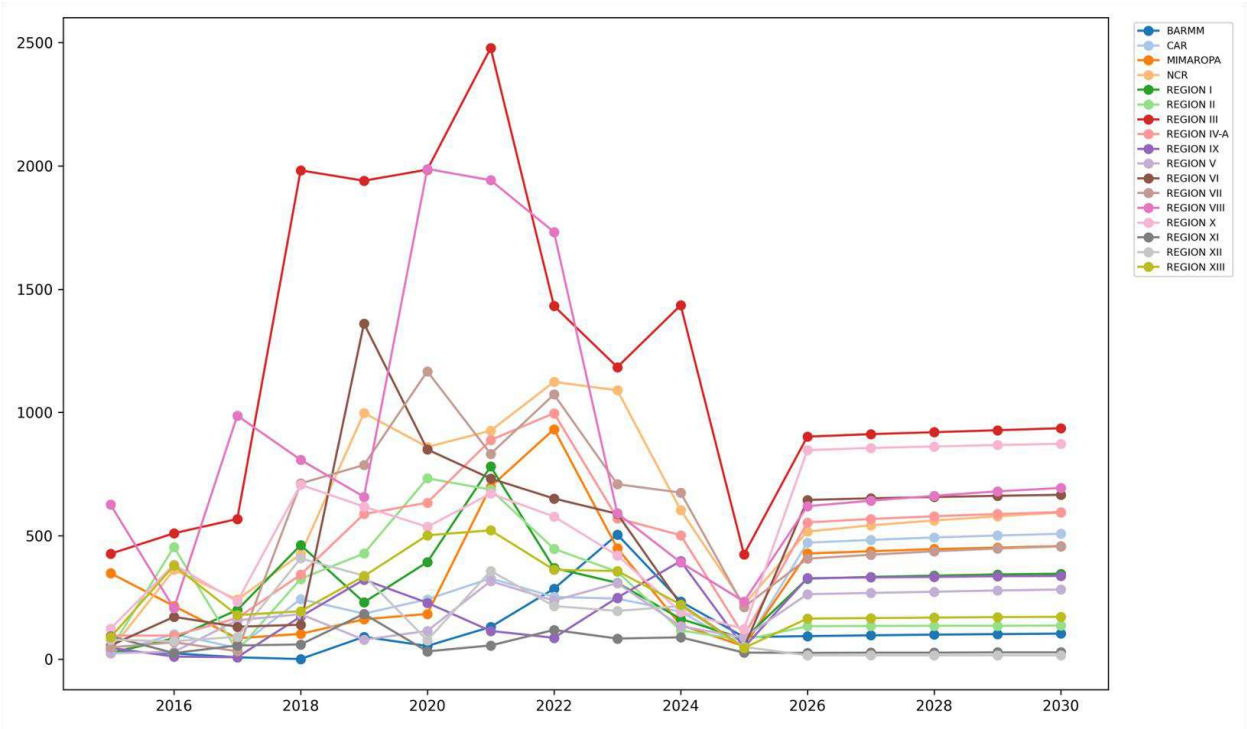


Figure 7. Research Citation Trend, 2015–2030

Figure 7 combines historical (2015–2025) and forecasted (2026–2030) citation data into a single sixteen-year view of regional research impact. Publication output rises in a fairly steady line; citation performance does not, because citations accumulate over time and depend on publication age, quality, journal visibility, collaboration, and the occasional highly-cited paper. The historical curves show sharp peaks and drops; the forecasted curves are noticeably smoother, a distinction that reflects how citation influence actually builds after publication rather than appearing immediately (Bornmann & Daniel, 2008; Moed, 2005).

The historical portion of the figure shows real variation across regions. Region III (Central Luzon) dominates throughout, climbing sharply from 2018 and peaking in 2021 before declining. That peak lines up with the region's strong publication output over the same years, meaning its research grew not just in quantity but also in influence. The decline after 2021 does not signal weaker research; it reflects the citation lifecycle and publication timing, since more recent work simply needs more time to mature. Bibliometric research documents the same pattern elsewhere: citations accelerate after publication, then stabilize as articles reach maturity (Bornmann & Daniel, 2008; Waltman, 2016).

Several other regions show comparable surges. Eastern Visayas (Region VIII) approached 2,000 citations in the early 2020s before easing off. Western Visayas (Region VI) exceeded 1,300 at its peak. CALABARZON, NCR, and Northern Mindanao all show notable fluctuation tied to periods of elevated scholarly influence. These swings suggest citation performance owes as much to individual highly-cited papers and expanding international collaboration as it does to publication volume, and international collaboration consistently raises citation impact through broader dissemination, methodological diversity, and visibility (Wagner & Leydesdorff, 2005; Elsevier, 2023).

Nearly every region shows a citation decline after 2022. That is not evidence of weaker research. Publications from 2023–2025 have simply had less time to accumulate citations than earlier work, so citation-based indicators understate the eventual impact of recent research until more time passes, a phenomenon well documented as citation lag (Moed, 2005; Bornmann & Daniel, 2008). Recent citation counts, in other words, need to be read with that lag in mind rather than taken at face value.

The shift from historical to forecasted values marks a clear move from volatility to stability. From 2026 onward, projected citation trajectories smooth out across every region, replacing the sharp historical swings with gradual annual gains, the expected result of a model built to track long-term trend while damping short-term noise. Hyndman and Athanasopoulos (2018) note that exponential smoothing suits short time series precisely because it preserves underlying trend without overreacting to random variation.

Regional rankings barely change through 2030. Region III (Central Luzon) keeps the top citation trajectory, followed by Region X (Northern Mindanao), Eastern Visayas, Western Visayas, and CALABARZON, each holding a clear lead over the rest of the country. Region XI (Davao Region), Region XII (SOCCSKSARGEN), BARMM, and CARAGA remain at the bottom throughout the forecast. This persistence backs up earlier findings tying research performance to

institutional resources, faculty qualifications, infrastructure, graduate capacity, and international collaboration access (Ambong et al., 2020; Ryazanova & Jaškiene, 2022; Suson et al., 2020).

No region is projected to decline after 2026, which suggests the gains of the past decade are likely to hold rather than reverse. Citation performance is forecast to rise steadily instead of cycling up and down, evidence that recent investment in research capacity, publication support, and internationalization may keep paying off. Still, the modest size of the projected annual gains means sustaining that growth will take continued institutional commitment to research quality, not just more publications. High citation impact depends on innovative research, placement in reputable journals, interdisciplinary collaboration, and work that speaks to globally relevant problems (Bornmann & Leydesdorff, 2014; Elsevier, 2023).

Figure 7, in short, shows a decade of volatile citation performance giving way to a more stable and predictable future. The country's research influence should keep expanding through 2030, but regional inequality is likely to persist alongside it. National research policy needs to look past publication counts and invest directly in research quality, international collaboration, journal visibility, and support for emerging research regions, the combination needed to make future publication growth translate into real scholarly influence and global standing (Bornmann & Leydesdorff, 2014; Ocampo et al., 2022; Waltman, 2016).

3.7 Spatial Distribution of Citation Impact (2015–2030)

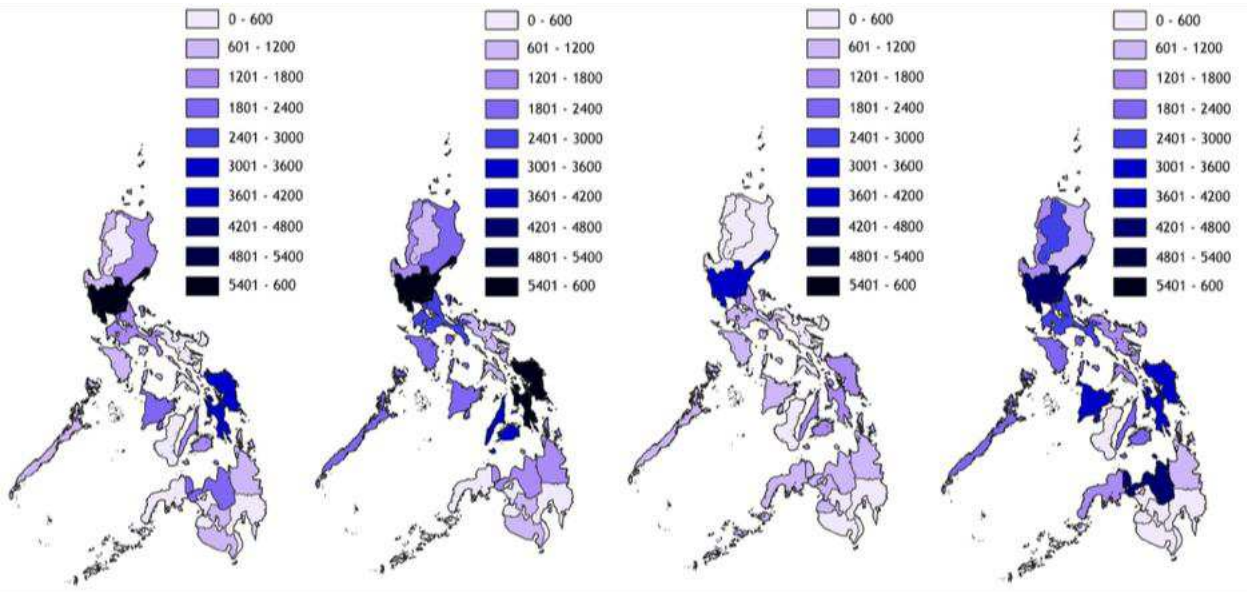


Figure 8. Research Citation Maps, 2015–2030

Figure 8 maps citation performance across four benchmark periods from 2015 to 2030, combining historical and forecasted data. Darker shading marks higher cumulative citations; lighter shading marks lower impact. Unlike the publication maps, which track research volume, these maps show the influence, visibility, and recognition research actually earns. Across all four periods, citation performance improves broadly but stays concentrated in a limited set of research-intensive regions, consistent with how scientific recognition compounds over time in institutions

that already have strong publication quality, broad collaboration, and international visibility (Bornmann & Daniel, 2008; Waltman, 2016).

Even in the earliest map, citation impact concentrates in a handful of regions, led by Region III (Central Luzon) in the darkest classification throughout. Eastern Visayas, Western Visayas, and parts of Northern Mindanao also show relatively high citation intensity, while several other regions remain in the lighter categories despite ongoing research activity, evidence of longstanding capacity gaps tied to infrastructure, faculty qualifications, graduate programs, and international collaboration access, all of which vary sharply by region (Ambong et al., 2020; Ryazanova & Jaškiene, 2022).

The later maps show citation influence expanding outward as more regions move into higher intensity categories, likely the cumulative result of sustained publication growth, expanding international collaboration, more Scopus-indexed output, and national research initiatives. As publication output rose over the past decade, citation impact followed, though typically after a lag, consistent with scientometric theory linking sustained high-quality output to eventual scholarly recognition (Bornmann & Leydesdorff, 2014; Moed, 2005).

The 2026–2030 forecast map keeps Region III (Central Luzon) in the highest citation classification, joined by Region X (Northern Mindanao), Eastern Visayas, Western Visayas, CALABARZON, and NCR, all holding relatively high citation intensity. Their persistence in the top categories suggests these research ecosystems have matured enough to sustain long-term scientific influence, a pattern that lines up with the quantitative citation forecasts identifying the same regions as the country's strongest future contributors. Elsevier (2023) attributes this kind of sustained influence to stable research governance, experienced faculty, and extensive collaborative networks that consistently produce internationally relevant, visible research.

Regional inequality in research influence nonetheless remains substantial. Region XI (Davao Region), BARMM, Region XII (SOCCSKSARGEN), and parts of Cagayan Valley and CARAGA stay in the lighter citation categories across both historical and forecast periods. Their citation intensity is improving, but far more slowly than the leading regions, evidence that funding, publication opportunities, international collaboration, and faculty capacity remain unequally distributed. Philippine studies reach the same conclusion: unequal access to research resources remains a central driver of regional gaps in productivity and citation impact (Gopez et al., 2024; Suson et al., 2020).

The maps also show research influence spreading beyond Metro Manila into multiple regions rather than staying concentrated there. Central Luzon, Western Visayas, Eastern Visayas, Northern Mindanao, and CALABARZON have each built substantial citation impact, evidence that research excellence is decentralizing across the Philippine higher education system. Scientometric research links this kind of geographic diversification to greater national research resilience, since it opens up more interdisciplinary collaboration, knowledge exchange, and regional innovation (Wagner & Leydesdorff, 2005; Ocampo et al., 2022).

For research planning, these maps argue for a dual strategy: sustain the momentum of high-performing institutions while investing specifically in emerging regions through research funding, faculty development, graduate education, collaborative networks, and publication support. That combination would build a more balanced national research ecosystem, one capable of high

productivity and broad scholarly influence across the entire Philippine higher education sector (Bornmann & Leydesdorff, 2014; Elsevier, 2023).

3.8 Regional Differences in Publication and Citation Performance

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of PUB is the same across categories of REGION.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of CITATION is the same across categories of REGION.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Table 5. Test of Differences in Publication and Citation across Regions, 2015–2025

Table 5 reports the Kruskal-Wallis test results for regional differences in publication and citation performance among Philippine SUCs across the full 2015–2025 period. Both indicators differ significantly by region ($p < .001$ for each), so both null hypotheses were rejected: research productivity and scholarly impact vary significantly across Philippine regions.

These results confirm the descriptive pattern already established: Central Luzon, NCR, Western Visayas, and Eastern Visayas consistently outperform the rest of the country in both publication and citation output. The gap likely traces to institutional research capacity, funding, infrastructure, faculty qualifications, and collaboration networks, the same factors the literature identifies as the leading determinants of research performance (Ocampo et al., 2022; Ryazanova & Jaškiene, 2022), and the same pattern that Gopez et al. (2024) and Lunag et al. (2023) report elsewhere in Philippine research.

Because the Kruskal-Wallis test only establishes that group differences exist, post hoc pairwise comparisons followed to identify exactly which regions differ from which.

Independent-Samples Kruskal-Wallis Test Summary

Total N	187
Test Statistic	60.441[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 6. Test of Differences in Publication across SUCs, 2015–2025

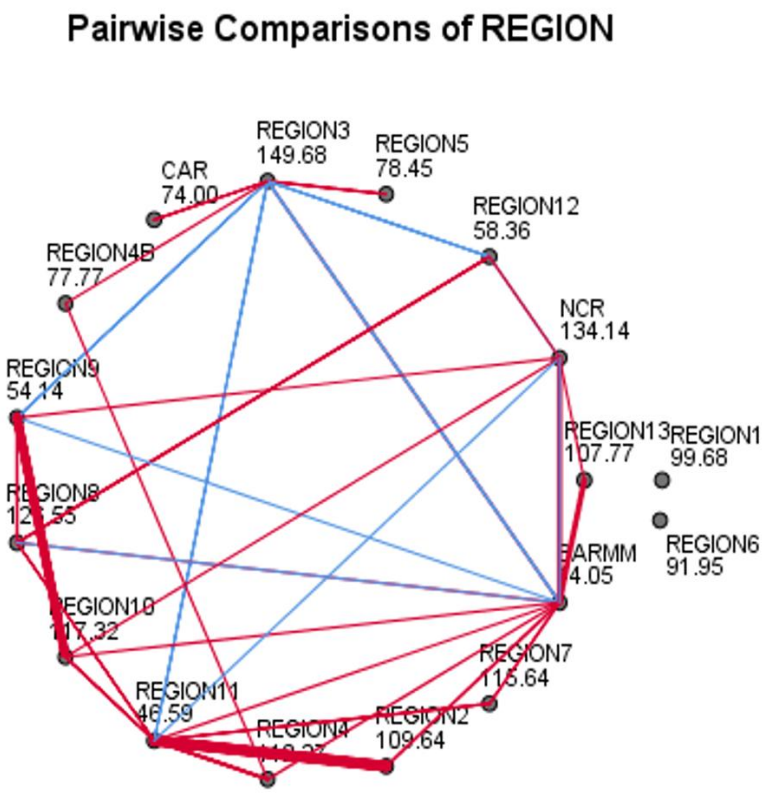


Figure 9. Post Hoc Pairwise Comparisons of Regional Publication Output, 2015–2025

Table 6 reports the Kruskal-Wallis results for publication productivity specifically. Output differs significantly across regions, $H(16) = 60.441$, $p < .001$, rejecting the null hypothesis. Post hoc comparisons (Figure 9) place Region III (Central Luzon) at the top with a mean rank of 149.68, followed by NCR (134.14) and Region VII (115.64). BARMM sits at the bottom with a mean rank of just 4.05, followed by Region XI (46.59), Region IX (54.14), and Region XII (58.36). These rankings match the broader literature on institutional research capacity, funding, faculty competence, and collaborative networks as the drivers of productivity gaps (Gopez et al., 2024; Ocampo et al., 2022; Ryazanova & Jaškiene, 2022), and point toward the same conclusion: lower-performing regions need targeted capacity-building, not generic, system-wide incentives.

Independent-Samples Kruskal-Wallis Test Summary

Total N	187
Test Statistic	74.704[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 7. Test of Differences in Citation across SUCs, 2015–2025

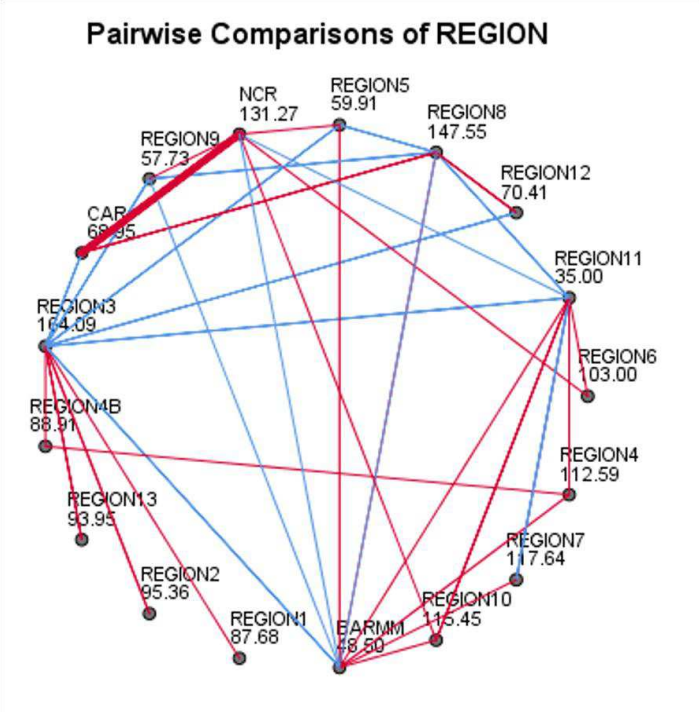


Figure 10. Post Hoc Pairwise Comparisons of Regional Citation Impact, 2015–2025

Table 7 reports the equivalent test for citation performance. Citations also differ significantly by region, $H(16) = 74.704$, $p < .001$, rejecting the null hypothesis. Post hoc comparisons (Figure 10) again place Region III on top with a mean rank of 164.09, followed by Region VIII (147.55) and NCR (131.27). Region XI sits lowest at 35.00, followed by BARMM (48.50), Region IX (57.73), and Region V (59.91). Regions with stronger research ecosystems, in other words, do not just publish more, they generate work with greater reach and recognition, a pattern the literature ties to research quality, high-impact journal placement, and international collaboration (Bornmann & Daniel, 2008; Elsevier, 2023; Waltman, 2016). Strengthening research quality and visibility in the lower-performing regions therefore needs to be treated as its own policy priority, separate from raising publication counts.

3.9 Temporal Differences: Pre-Pandemic, Pandemic, Post-Pandemic, and Forecast Comparisons

3.9.1 Forecasted period (2026–2030)

Independent-Samples Kruskal-Wallis Test Summary

Total N	85
Test Statistic	81.594[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 8. Forecasted Publication

Independent-Samples Kruskal-Wallis Test Summary

Total N	85
Test Statistic	83.377[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 9. Forecasted Citation

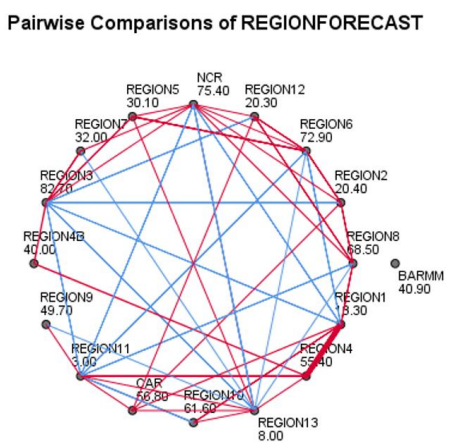


Figure 11. Post Hoc: Forecasted Publication

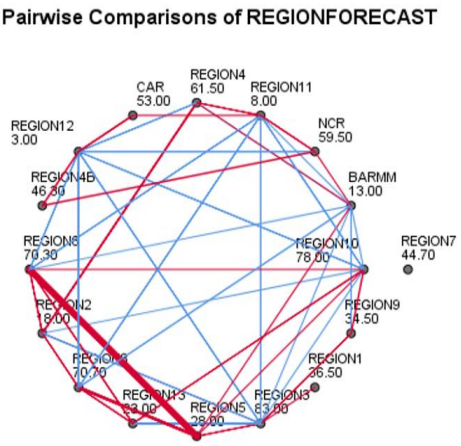


Figure 12. Post Hoc: Forecasted Citation

Table 8 and Table 9 report the Kruskal-Wallis results for forecasted publication and citation performance. Both differ significantly by region, $H(16) = 81.594$, $p < .001$ for publication, and $H(16) = 83.377$, $p < .001$ for citation, rejecting both null hypotheses and indicating that regional disparities are projected to persist rather than close on their own. Post hoc comparisons for forecasted publication (Figure 11) place Region III (Central Luzon) highest with a mean rank of 82.70, followed by NCR (75.40), Region VI (72.90), and Region VIII (68.50); Region XI (Davao Region) ranks lowest at 3.00, followed by Region XIII (8.00) and Region I (8.30). For forecasted citation (Figure 12), Region X (Northern Mindanao) ranks highest at 78.00, followed by Region VIII (70.70), Region VI (70.30), and Region III (63.00); Region XII (SOCCSKSARGEN) ranks lowest at 3.00, followed by Region XI (8.00) and BARMM (13.00). Northern Mindanao's citation lead over Central Luzon here, despite Central Luzon's larger cumulative citation total, suggests its forecasted output carries more consistent influence relative to its volume, a distinction the raw totals in Section 3.5 do not fully capture. These projections confirm that current regional advantages in research capacity are structural enough to persist through 2030 without deliberate intervention.

3.9.2 Pre-pandemic period (2015–2019)

Independent-Samples Kruskal-Wallis Test Summary

Total N	85
Test Statistic	44.755[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 10. Pre-Pandemic Publication

Independent-Samples Kruskal-Wallis Test Summary

Total N	85
Test Statistic	38.474[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.001

a. The test statistic is adjusted for ties.

Table 11. Pre-Pandemic Citation

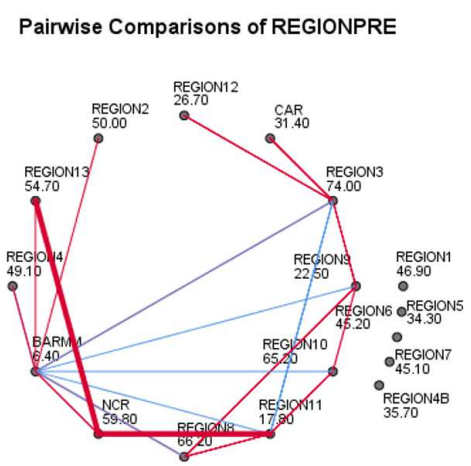


Figure 13. Post Hoc: Pre-Pandemic Publication

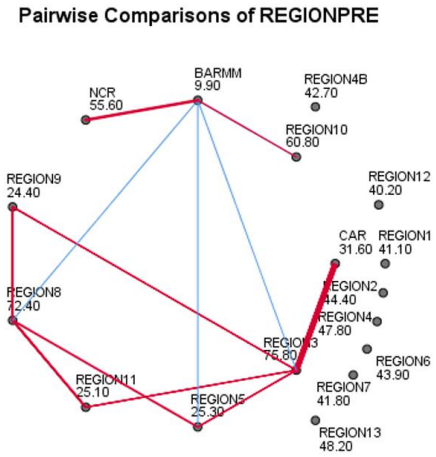


Figure 14. Post Hoc: Pre-Pandemic Citation

The Kruskal-Wallis test found significant regional differences before the pandemic for both publication, $H(16) = 44.755$, $p < .001$, and citation, $H(16) = 38.474$, $p = .001$, shown in Table 10 and Table 11. Regional disparities, in other words, predate COVID-19; they were not created by it. Post hoc comparisons (Figures 13 and 14) place Region III highest for both publication (mean rank 74.00) and citation (75.80), followed by Region VIII (66.20 publication; 72.40 citation) and Region X (65.20 publication; 60.80 citation); NCR ranks fourth for citation at 55.60. BARMM sits lowest on both measures, 6.40 for publication and 9.90 for citation. These findings match earlier work showing that institutional research capacity, funding, and infrastructure already diverged sharply across Philippine regions well before the pandemic (Gopez et al., 2024; Ocampo et al., 2022; Ryazanova & Jaškiene, 2022).

3.9.3 Pandemic period (2020–2022)

Independent-Samples Kruskal-Wallis Test Summary

Total N	51
Test Statistic	44.729[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 12. Pandemic-Period Publication

Independent-Samples Kruskal-Wallis Test Summary

Total N	51
Test Statistic	44.262[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 13. Pandemic-Period Citation

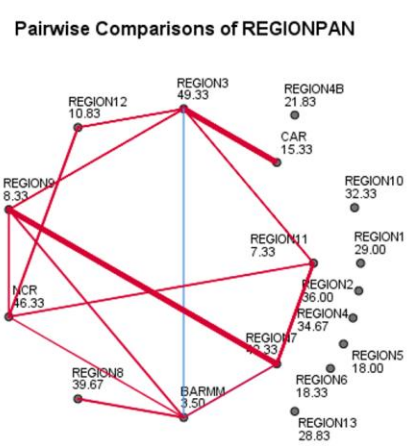


Figure 15. Post Hoc: Pandemic-Period Publication

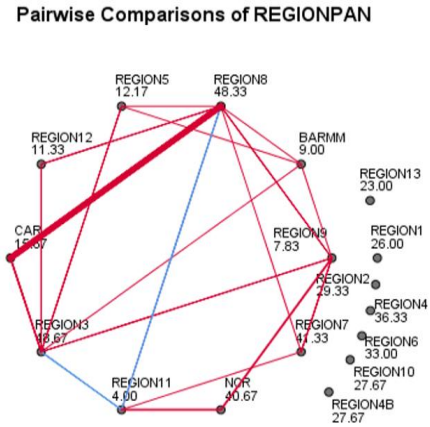


Figure 16. Post Hoc: Pandemic-Period Citation

The Kruskal-Wallis test found significant regional differences during the pandemic for both publication, $H(16) = 44.729$, $p < .001$, and citation, $H(16) = 44.262$, $p < .001$, shown in Table 12 and Table 13. Post hoc comparisons (Figures 15 and 16) place Region III highest for both publication (mean rank 49.33) and citation (48.67), closely followed for citation by Region VIII (48.33); NCR ranks second for publication (46.33) and fourth for citation (40.67). BARMM ranks lowest for publication (3.50), and Region XI ranks lowest for citation (4.00). Regional disparities persisted through the pandemic years largely unchanged from their pre-pandemic pattern, evidence that COVID-19 disrupted the pace of Philippine research activity without reshaping which regions led it.

3.9.4 Post-pandemic period (2023–2025)

Independent-Samples Kruskal-Wallis Test Summary

Total N	51
Test Statistic	44.445[a]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 14. Post-Pandemic Publication

Independent-Samples Kruskal-Wallis Test Summary

Total N	51
Test Statistic	21.710[a,b]
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.153

a. The test statistic is adjusted for ties.

b. Multiple comparisons are not performed because the overall test does not show significant differences across samples.

Table 15. Post-Pandemic Citation

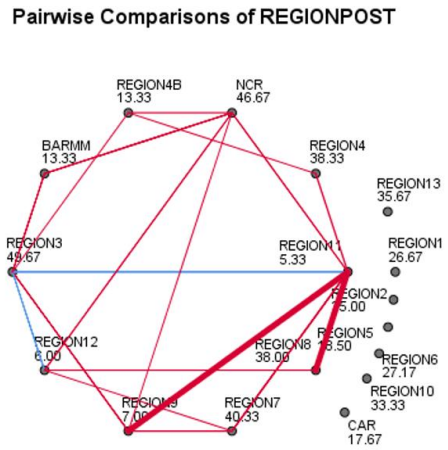


Figure 17. Post Hoc: Post-Pandemic Publication

The Kruskal-Wallis test found a significant regional difference in publication productivity post-pandemic, $H(16) = 44.445$, $p < .001$ (Table 14), but no significant difference in citation performance, $H(16) = 21.710$, $p = .153$ (Table 15). The null hypothesis was rejected for publication and retained for citation. Post hoc comparisons for publication (Figure 17) place Region III highest (mean rank 49.67), followed by NCR (46.67) and Region VII (40.33); Region XI (5.33) and Region XII (6.00) rank lowest. No post hoc test was run for citation, since the overall test was not significant.

The null result for post-pandemic citation is worth pausing on, since it is easy to misread. It most plausibly reflects citation lag rather than converging research impact: publications from 2023–2025 have had too little time to accumulate citations, so the usual gap between leading and lagging regions has not yet had time to show up in the data (Bornmann & Daniel, 2008; Moed, 2005). Regions did not close their citation gap during this period; the data has simply not caught up to it yet.

Read together, these four period-by-period comparisons tell a consistent story. Regional disparities in Philippine research productivity predate the pandemic, persisted through it, continue in its aftermath, and are on track to persist through 2030 without a deliberate policy response. Publication output has grown almost everywhere, which is real progress, but citation impact, quality, and international visibility remain concentrated among the same handful of regions across every period tested. Closing that gap will take intervention aimed specifically at the lagging regions, not further investment in the regions already leading.

4. CONCLUSION

This study set out to measure how Philippine SUCs have performed on Scopus-indexed research productivity from 2015 to 2025, and to project where that performance is heading through 2030. The answer to RQ1 is straightforward: publication output rose almost everywhere over the decade, and citation impact grew alongside it, though far less evenly. The answer to RQ2 and RQ3 is equally clear: regional differences in both publication and citation performance are statistically significant in every period tested ($p < .001$ in nearly every case), and Region III (Central Luzon)

leads the country on both measures by a wide margin, with NCR, Western Visayas, and Eastern Visayas forming a clear second tier. Region XI (Davao Region), BARMM, and Region XII (SOCCSKSARGEN) remain at the bottom throughout. On RQ4, the forecast indicates that this ranking will not change on its own: Region III is projected to keep leading through 2030, and today's lowest performers are projected to stay there, since Holt's damped trend model finds no structural break in the underlying growth patterns.

The clearest finding across every analysis is not that Philippine research productivity is rising, though it is, but that it is rising unequally, and that inequality is structural rather than incidental. It predates the pandemic, survived it, and is on track to outlast it as well. National policy has succeeded in raising research output as a whole. It has not yet succeeded in closing the gap between the institutions doing that research and the ones still building the capacity to do it.

4.1 Practical and Policy Implications

Three implications follow directly from these results. First, national research funding needs a two-track design: continued support for high-performing regions to sustain their momentum, paired with capacity-building funding specifically earmarked for lagging regions, since uniform, system-wide incentives have not closed the gap over the past decade and are unlikely to close it over the next five years either. Second, institutions and policymakers alike need to stop treating publication counts as a proxy for research impact. Citation performance depends on journal placement, international collaboration, and research quality, factors that a publication-counting incentive structure does not directly reward. Third, the persistence of regional gaps through the pandemic and into the forecast period argues for treating this as a long-term structural problem rather than a temporary one that current programs will eventually resolve on their own.

4.2 Limitations and Future Research

This study has four limitations worth stating plainly. First, it relies on Scopus-indexed output alone, which excludes locally published, non-Scopus-indexed Philippine research that may represent a meaningful share of some institutions' actual scholarly output. Second, the forecasting model assumes that current institutional and policy conditions hold roughly steady through 2030; a major funding shift, policy change, or another large-scale disruption could move actual outcomes away from the projections presented here. Third, the analysis aggregates institutional data to the regional level, which can mask meaningful variation between individual universities within the same region. Fourth, citation-based indicators for the most recent years are affected by citation lag, meaning post-pandemic citation impact in particular is likely understated and should be revisited as more time passes.

Future research should disaggregate these regional findings to the institutional level to identify which specific universities drive each region's performance, extend the analysis to non-Scopus-indexed Philippine journals to capture research currently invisible to this dataset, and revisit the post-pandemic and forecast citation figures once more citation data has had time to accumulate. A qualitative follow-up examining what specific policies or institutional practices separate Region III from lagging regions would also give policymakers something more actionable than the regional rankings reported here.

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Data Availability: The bibliometric data supporting this study were extracted from Elsevier SciVal and Scopus and are available from the corresponding author upon reasonable request.

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