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Stratification of research productivity across academic career stages in a teaching-centric institution

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ABSTRACT

Research productivity for higher education institutions (HEIs) and academics is measured through scholarly research output. In the Global South HEIs, faculty training programs for early-career academics (ECAs) and mid-career academics (MCAs) are employed to enhance research productivity. Academic institutions typically program organizational research productivity based on their envisioned horizontal typology and academic background instead of research productivity. This study examines the research productivity across academic career stages from a teaching-focused HEI. Since teaching-centric HEIs need to progress into research-intensive institutions, understanding the stratification of research productivity allows the matching and customization of faculty development programs. An online survey was distributed to 104 academic faculties: 44 ECAs, 57 MCAs, and 3 late-career academics (LCAs). Descriptive and inferential statistics were used to present the distribution and relationship among demographic and academic profiles, respectively. For a teaching-focused HEI, it has been observed that research productivity is strongly evident for MCAs as compared to ECAs and LCAs. Correlational analysis shows a moderate positive correlation between academic rank and research productivity. This study presents the stratification of research productivity across the academic levels of a teaching-focused institution. A strategic human resources development plan is suggested to support the meaningful assimilation of research culture in HEIs.

Contribution/Originality: Existing literature has not reported the level of productivity across academic career stages in teaching-focused institutions. This study presents the type and typical quantity of generated scholarly research outputs across academic career stages from a teaching-focused HEI.

1. INTRODUCTION

Academic career development involves the career progression of academic faculty in higher education institutions (HEIs) from teaching experience to research productivity, and administrative contributions (Zacher, Rudolph, Todorovic, & Ammann, 2019). For career progression, early-career academics (ECAs) need to define their goals and employ time management for successful tenureship and steady career development (Applegate & Williams, 1990). On the other hand, mid-career academics (MCAs) (46-65 years old) and late-career academics

(LCAs) (above 65 years old) are in the maintenance and decline stages of their academic careers, respectively (Zacher et al., 2019). Career progression of ECAs and MCAs occurs when there is an established institutional research culture as it has been associated with research productivity (Kaloudis et al., 2019). This study aims to examine the research productivity across academic career stages from a teaching-focused HEI. Existing literature has not reported the differences in research productivity across academic career stages in a teaching-focused institution. Since teaching-focused HEIs need to progress into research-intensive institutions understanding the stratification of research productivity allows the matching and customization of faculty development programs.

Research culture in higher education is the amalgamation of collective behavior and shared beliefs that translate research practice into concrete outputs (Evans, 2015). However, building a research culture is complex, multifaceted and costly due to the socioeconomic and political environment of HEIs (Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2016). For example, structural equation modeling was used to determine factors that affect the research culture of HEIs (Bhatti, Alyahya, & Alshiha, 2022). Research culture has also been related to the research environment by HEIs and policymakers (Callard, 2024). In some case studies, the research culture of public universities has been influenced by state-related factors (e.g., budget, policies, incentives, etc.) (Thien, 2021). From institutional theory, institutional culture influences the behavior and attitudes of its members (Barnes, du Plessis, & Frantz, 2021; Serinkan & Kiziloglu, 2021). On the other hand, behavior can be expressed as observable actions caused by a certain stimulus (Barnes et al., 2021; Bergh, 2006). The institutional or organizational research culture of the HEI enables the emergence and sustainability of the research behavior of its academic faculty.

The institutional research culture of HEIs can be presented in the following three stages: gestation, expansion, and maturation (Olvido, 2021). The gestation stage involves the capacity building of faculty members on research planning, implementation and dissemination. ECAs are key players in the gestation stage of institutional research culture. All ECAs are within five years of their careers in an academic environment with contractual or permanent positions and are tasked to perform only research, teaching, or both (Hemmings, 2012; Hollywood, McCarthy, Spencely, & Winstone, 2020). Some sources of confidence in the research of ECAs come from graduate student research, research experience, researcher identity, mentorship, and research collaboration (Hemmings, 2012; Mgaiwa & Kapinga, 2021; Mydin, Rahman, & Mohammad, 2021). The expansion stage is the successful completion of research dissemination through conference presentations, journal publications and patents. The maturation stage is the commercialization and utilization of research and development outputs. The productivity-oriented model is the basis of the current research productivity metrics measured using the quantity of high-impact journal publications and their citation index (Sutherland, 2018). A teaching-focused institution with low research productivity may be classified in the gestation stage of institutional research culture.

Research productivity is an outcome of the research ability of the academic faculty. Since studies have shown that academic career levels affect productivity, the research productivity of ECAs, MCAs, and late-career academics (LCAs) is expected to vary significantly. For research-intensive institutions, academic progression would be associated with higher levels of research productivity. Several recent studies still investigate the academic research productivity of Philippine State Universities and Colleges (SUCs) (Cerado & Naanep, 2023; Duyan, 2022; Naanep & Cerado, 2023). However, empirical evidence has not been presented on the extent of the stratification of research productivity among academic career levels for teaching-focused SUCs. The correlation between academic progression and research productivity needs to be determined empirically for academic environments without a strong institutional research culture. A national strategy for transitioning from teaching-focused to research-intensive HEIs in the Philippines is being developed.

In this study, the differences in the research productivity across academic career stages from a teaching-centric HEI were examined. Research productivity is measured by the quantity of thesis advising, journal publications, conference presentations, and research grants. Since teaching-focused HEIs need to progress into research-intensive institutions, understanding the stratification of research productivity allows the matching and

customization of faculty development programs. An online survey about demographic profiles and scholarly research outputs was distributed across academic career stages of ECAs, MCAs, and LCAs. Descriptive and inferential statistics were used to present the distribution and relationship among demographic and academic profiles, respectively. For a teaching-focused HEI, it has been observed that research productivity is strongly evident for MCAs as compared to ECAs and LCAs. Correlational analysis shows a moderate positive correlation between academic rank and research productivity. This study presents the stratification of research productivity across the academic levels of a teaching-focused institution. A strategic human resources development plan is suggested to support the meaningful assimilation of research culture in HEIs.

2. REVIEW OF RELATED LITERATURE

2.1. HEIs in the Global South

Several research productivity metrics are used to measure the research productivity of HEIs and academics: quantity of journal publications, citation index, conference presentations, and research grants (Kavic & Satava, 2021; Langfeldt, Reymert, & Aksnes, 2021; Ocampo et al., 2022). The efficient generation of scholarly outputs is enabled by organizational policies, financial resources, and support systems. The Global South is defined as low- and middle-income countries belonging to the northern and southern hemispheres (Lor, 2023). Limited resources translate to insufficient allocations for research funding. Typically, below 1% of gross domestic product (GDP) is allocated for research funding for most countries in the Global South (e.g., Africa, Latin America, Asia, and Oceania). Consequently, financial resources for research activities also trickle down to the lack of capacity building, human resources and infrastructure (Lor, 2023).

For individual academics, research productivity is supported through academic career progression (Helali, 2024). Although traditional research enablers are known, the resources needed to implement are limited in the Global South. In some middle-income countries, research productivity is not embedded in academic career progression (Kpolovie & Dorgu, 2019). In teaching-focused HEIs, faculty training programs for ECAs and MCAs are usually employed to enhance organizational research productivity (Cain & Allan, 2017). However, seminars and workshops on faculty research may be disconnected and surface-level which fails to address the skills gaps of the academic faculty (Bantugan, Añonuevo, & Maligaya, 2022; Hammad & Al-Ani, 2021). There were reports that HEIs in developing countries offer faculty training programs that are fragmented and without a guiding strategic plan (Véliz, Bernasconi, Celis, Mella, & Miranda, 2023). Therefore, faculty training programs should develop an institutional research culture besides knowledge transfer (Ridley, 2011). From the institutional research culture, the research behavior of the academic faculty becomes intrinsic to research generation, implementation, and dissemination. Several studies used the following methods to study research behavior: structural equation modeling (Chuayounan, 2023) and research engagement with the theory of planned behavior (Baquiano, 2024). Research proficiency is an essential component of the research behavior of the faculty. Fogg's model of behavioral change proposes that an individual's behavior is influenced by ability or proficiency and motivation.

2.2. Philippine Context of SUCs

Recent studies reported that the Philippines was ranked 6th in the ASEAN region in terms of the number of publications and citations (Lunag Jr et al., 2024). This low ranking was associated with the lack of researchers (198 researchers per million) due to insufficient government budget allocations for research and development (R&D) (Lunag Jr et al., 2024). UNESCO prescribes a ratio of 380 scientists and engineer researchers per million. The Philippines has been described as having an underdeveloped research and innovation ecosystem (Bautista, Paqueo, & Orbeta, 2023).

In the case of 112 Philippine SUCs, it has been reported that the majority of these HEIs have low research productivity or are described with non-existent academic research behavior (Moreno & Josephine, 2023; Naanep & Cerado, 2023; Peñaredondo-Untong, 2020).

The majority of Philippine SUCs are in the lower-order research profiles which were defined as institutions that are inclined to teaching-focused activities instead of research-intensive activities (Hemmings, Hill, & Sharp, 2013). The publish-or-perish culture in HEIs in developed countries exerts pressure on ECAs for their improved research performance and collaboration (Aprile, Ellem, & Lole, 2021; Fisher & James, 2022). As a consequence, ECAs abandon teaching for research, acquire unethical publication practices, and experience high stress levels (Mula, Rodríguez, Domingo Segovia, & Cruz-González, 2022).

In contrast, this tenure requirement for a publication has not been reported in the literature for Philippine SUCs. Despite numerous studies on low research productivity, there is a dearth of literature on strategies for establishing a successful institutional research culture for Philippine HEIs (Lunag Jr et al., 2024).

Various approaches can be utilized to establish and develop a research culture for institutions of higher learning.

Design thinking was demonstrated to establish a research culture in HEI (White & Deevy, 2020). Two studies consolidated the best research practices from a local university consortium and invited experts on a multinational level to be benchmarked for establishing research culture (Kent et al., 2022; Quitoras & Abuso, 2021). Research cohorts were also formed to build an institutional research culture (Khoo, 2023).

The Philippine government has support programs that help HEIs enhance their research productivity. For example, the RDLead program of the National Research Council of the Philippines (NRCP) of the Department of Science and Technology (DOST) aims to support the development and enhancement of the research capabilities of the academe, research and development institutes and other government agencies (Quimba, Albert, & Llanto, 2017). The RDLeaders are assigned to a host institution for capacity-building activities on research and development. A study reported challenges in implementing the RDLead program on two HEIs (Bantugan et al., 2022). It was deduced that one-year engagement with the RDLead program may be insufficient to solve underlying systematic and contextual roadblocks to enhance the research productivity of a HEI.

Despite this, the RDLead program has been shown to support the initiation of an institutional research culture and enhance organizational research productivity. For policies supporting research productivity, the Commission on Higher Education (CHED) released memorandum orders that focus on the generation of journal publications from HEIs.

CHED issued 2019 guidelines for granting autonomous status to HEIs in terms of research involvement of 50 full-time faculty (or 30% of the full-time faculty members) and publications in refereed journals for at least 10% of the full-time faculty members. CHED also issued Memorandum Order No. 15, series of 2019 which requires all graduate students to publish an article in a refereed journal.

3. METHODOLOGY

3.1. Research Design

The study utilized the descriptive-correlational research design to present the research productivity of ECAs, MCAs, and LCAs from a teaching-focused higher education institution.

3.2. Research Locale

The study was carried out during the RDLead mentoring program at the following four campuses of the Philippine State College of Aeronautics (PhilSCA): Villamor Air Base (VAB) in Pasay City, Basa Air Base (BAB) in Floridablanca, Pampanga, Fernando Air Base (FAB) in Lipa City, Batangas and Mactan Benito N. Ebuen Air Base (MBEAB) in Lapu-Lapu City in Cebu.

3.3. Research Participants

For this study, ECAs and MCAs are categorized as having lengths of service of less than 5 years and above 5 years in the state college. In addition, ECAs and MCAs have ages below 60 years which is the start of the optional retirement age for Philippine government service. Similarly, there is mandatory retirement at the age of 65 years old for government employees.

ECAs have the opportunity to finish their master's within 3-5 years of employment in the institution. The 104 participants of the study were 44 ECAs, 57 MCAs, and three LCAs (above 60 years old) who participated in the DOST-NRCP RDLead mentoring program. The participants represent 62% of the academic faculty (out of 169 regular faculties) who were interested in the aforementioned faculty development program. These academic faculties have exhibited active engagement in the faculty mentoring program with their signed commitment letters for their regular attendance and completion of research output requirements. For the RDLead mentoring program for PhilSCA, hybrid seminar workshops were conducted on research conception and planning, journal article writing, research conference presentations, and project proposal writing.

3.4. Research Instrument

The quantity of self-reported thesis advising, institutional and external conferences, journal publications, and research grants was used to determine the research productivity of the ECAs, MCAs, and LCAs. The participants' demographic profiles (age, sex, academic rank, highest educational attainment, length of service, and length of R&D involvement) and academic profiles (number of theses advising, conference presentations, and journal publications) were also collected.

3.5. Data Gathering Procedure

An online survey was distributed to the academic faculty after the signing of the commitment letters to the RDLead mentoring program and before the start of the actual face-to-face seminars and workshops on research conception at each campus of the state college.

3.6. Data Processing

For descriptive statistics, the percentage of the frequency of categories of demographic and academic profiles was computed to visualize the population distribution of characteristics of ECA and MCA. For the inferential statistics, the discrete intervals of data with equal-width binning were first assigned integer values. The data from the demographic and academic profiles were arranged into four category levels and assigned integer values. For example, the four levels of academic ranks of instructor, assistant professor, associate professor, and professor were assigned integer values of 1-4.

After this, Pearson's correlation coefficient was calculated from pairing sets of data from demographic and academic profiles. Discretization of data sets was employed for noise reduction by removing outlier data and for straightforward data interpretation from low, medium, and high levels.

3.7. Ethical Considerations

The purpose of the online survey was to serve as baseline data for the institutional research readiness assessment report required by the RDLead program. This research purpose was articulated in the background information of the online survey. In addition, a consent form was presented on the first page of the survey. The personal identities of the participants of the study were maintained to be anonymous and secure. The findings of the study were presented completely and accurately. The study upholds ethical standards and maintains research integrity. Ethical approval was granted by the Research and Development Center of PhilSCA (Ref. No. RDC-001-2024).

4. RESULTS AND DISCUSSION

4.1. Background of the Teaching-Focused HEI

PhilSCA is the only local SUC that offers baccalaureate and graduate programs in aeronautics and aviation studies. Republic Act (RA) 7605 states that PhilSCA focuses on aeronautics and aviation education. The policy is further supported by the Philippine Civil Aviation Regulation (PCAR) Part 3 of the Civil Aviation Authority of the Philippines (CAAP) on the proposed curriculum on aircraft maintenance technology, aviation electronics technology, and air transportation.

The Policies, Standards, and Guidelines (PSG) on aeronautical engineering are stipulated in CHED Memorandum Order No. 76. These concrete and stringent technical standards for the educational programs of PhilSCA espouse a teaching-centric institution. PhilSCA may be classified as a teaching-focused HEI in its Memorandum Order No. 9 - Series of 2019. The CHED has classified PhilSCA with SUC level I out of the five SUC levels, which is considered a SUC in the early stage of development (Cerado & Naanep, 2023). Of the 112 SUCs in the Philippines, there are 10 SUCs with level I and 19 SUCs with level II classifications. In the Department of Budget and Management (DBM)-CHED Joint Circular No. 1 - Series of 2016, one of the key result areas of the CHED SUC leveling instrument is KRA 4 on Research Capability and Output (Ambong, Dagos, Susanita, Roldan, & Ferrer, 2022).

As a teaching-focused institution, PhilSCA has accumulated minimum scores for the key research area on research productivity from the previous CHED SUC leveling assessment. Nevertheless, the RDLead program of DOST-NRCP was availed by PhilSCA to strengthen its research productivity.

4.2. Demographic Profile of the Academic Faculty

For ECAs in the study, the entry-level requirement is a master's degree as mandated by CHED. Higher educational qualifications and research productivity are both part of the criteria in the academic promotion scheme for Philippine SUCs. Similarly, the crossover from an academic rank of associate professor to professor in academic promotion already requires a doctoral degree. MCAs are within the academic ranks of assistant and associate professor levels which are achieved by pursuing doctoral degrees and generating research outputs.

The demographic profile among the academic career levels is shown in Table 1. Of the 104 academic faculties, the majority come from 57 MCAs, which comprise 55% of the participants of the study. MCAs are almost equally represented for ages 26-45 and 46-60 years old and academic ranks from instructor to associate professor. Their lengths of academic service are almost equally represented in three-decade generations. In terms of educational qualifications, the majority of the MCAs (54.4%) did not pursue higher studies after their master's degrees, while only more than one-third of MCAs pursued doctoral degrees. In addition, only 7.1% of MCAs have been involved in research for more than five years. This implies that the majority of the MCAs may have pursued research activities during their transition from ECA to MCA. It has been reported by Ambong and Estrellado (2024) that academic faculty in SUCs have difficulty being promoted to higher ranks due to their inability to conduct research implementation and dissemination. Moreover, they have reported that merit promotions were not based on research capability. The length of service and graduate level of the faculty members indicate a research experience of research dissemination and motivation for a higher rank.

Forty-two percent of the faculties are ECAs, with a majority (60.6%) of instructors and 36.4% with master's degrees. The majority of the ECAs are aged 26-45 years old and around half are still pursuing a master's degree and have not been involved with research activities. The LCAs were only 3% of the participants in the study. Despite working for more than 20 years, LCAs have remained in the academic ranks of associate professors and most have been only involved in research for less than five years.

Table 1. Demographic profile of 104 academic faculties with 44 ECAs, 57 MCAs, and 3 LCAs. ECAs and MCAs have ages below 60 years old and lengths of academic service below and above 5 years, respectively. LCAs are above 60 years old.

Demographics profile category	Overall (n = 104)		Academic career levels					
			Early-career academics (ECAs) (n = 44)		Mid-career academics (MCAs) (n = 57)		Late-career academics (LCAs) (n = 3)	
	Frequency (*f*)	Percentage (%)	*f*	%	*F*	%	*f*	%
Age (years)								
18-25	10	9.6	10	22.7	0	0	0	0
26-45	57	54.8	29	65.9	28	49.1	0	0
46-60	34	32.7	5	11.4	29	50.9	0	0
Above 60	3	2.9	0	0	0	0	3	100
Sex								
Male	71	67.6	34	77.3	34	59.6	1	33.3
Female	34	32.4	10	22.7	23	40.4	2	77.7
Academic rank								
Instructor	63	60.6	43	97.7	20	35.1	0	0
Assistant professor	19	18.3	1	2.3	18	31.6	0	0
Associate professor	21	20.2	0	0	18	31.6	3	100
Professor	1	1.0	0	0	1	1.8	0	0
Length of academic service (years)								
Less than 2	18	17.0	18	41	0	0	0	0
Between 2 and 5	26	25.0	26	59	0	0	0	0
Between 5 and 10	25	24.0	0	0	25.0	44.0	0	0
Between 10 to 20	15	14.0	0	0	15.0	34.0	0	0
Above 20	20	19.0	0	0	17.0	30.0	3	100.0
Highest educational attainment								
Bachelor	5	4.8	4	9.1	0	0	0	0
With master's units	25	24.0	21	47.7	5	8.8	0	0
Masters	48	46.2	16	36.4	31	54.4	1	33.3
With doctoral units	15	14.4	2	4.5	11	19.3	1	33.3
Doctoral	11	10.6	1	2.3	10	17.5	1	33.3
Length of R&D involvement (years)								
None	56	53.8	32	72.7	26	45.6	1	33.3
Less than 5 years	43	41.3	11	25.0	27	47.4	1	33.3
6-10 years	4	3.8	1	2.3	3	5.3	0	0
Above 10 years	1	1.0	0	0	1	1.8	1	33.3

4.3. Academic Profile of the Faculty

The academic profile provides a summary of the accomplishments of the faculty member of a HEI (Fisher & James, 2022). In this study, the academic profile is measured in terms of the quantity of past thesis advising, research presentations at conferences and journal publications (see Table 2). In a teaching-focused institution, MCAs are already expected to be engaged in thesis advising. In PhilSCA, a majority (86%) of the MCAs are already involved in undergraduate thesis advising. However, only 21.1% of the MCAs have been able to advise more than ten theses, even with a period of more than five years of their academic service. Half of the ECAs have participated in thesis advising, while all LCAs have experience in thesis advising.

The student thesis is an avenue where faculty can practice both teaching and research competencies. Thesis advising is student-faculty research collaboration, which can be a source of co-authored conference presentations and journal publications. From the academic profile, ECAs (25%) and MCAs (43.9%) can translate thesis advising into a co-authored institutional conference that is co-organized by the institution [i.e., the Aviation Research Consortium annually organizes the Philippine Aviation Research Conference (PARC)]. However, few ECAs (9%) and MCAs (15.8%) have authored research presentations at institutional conferences. For journal publications, less than 20% of ECAs and MCAs have authored and co-authored articles. For R&D-funded projects, only 2 of the

faculty members have been involved as proponents and project members. Lastly, LCAs have not generated other research outputs other than thesis advice.

ECAs with master's degrees and MCAs are expected to generate journal publications. Specifically, 74 out of 104 academic faculties (71.2%) have completed master's degrees (see Table 1). CHED Memorandum Order (CMO) No. 15, Series of 2019 stipulates that graduate programs have a requirement of one refereed journal publication before graduation. Only 14 out of the 74 of the master's degree holders (13.5%) have authored journal publications (see Table 2). The academic rank of professorial level and post-graduate education may not ensure that the academic faculty has published a journal article. As a teaching-focused institution, it is expected that there will be few research credentials from the faculty.

Table 2. Summary of academic profile of the faculty

Academic profile categories		Categories	Overall (n = 104)		Academic career levels					
					ECAs (n = 44)		MCAs (n = 57)		LCAs (n = 3)	
			Frequency (*f*)	Percentage (%)	*f*	%	*f*	%	*f*	%
Undergraduate thesis advising		None	33	31.7	24	54.5	8	14.0	1	33.3
		1-10	58	55.8	19	43.2	37	64.9	1	33.3
		11-20	6	5.8	1	2.3	5	8.8	1	33.3
		Above 20	7	6.7	0	0.0	7	12.3	0	0
Institutional conference	Authored	None	71	67.6	36	81.8	48	84.2	0	0
		1-10	34	32.4	8	18.2	9	15.8	0	0
	Co-authored	None	68	65.4	33	75.0	32	56.1	0	0
		1-10	36	34.6	11	25.0	25	43.9	0	0
External conference	Authored	None	80	76.9	37	84.1	41	71.9	0	0
		1-10	23	22.1	7	15.9	15	26.3	0	0
		11-20	0	0	0	0	0	0	0	0
		Above 20	1	1.0	0	0	1	1.8	0	0
	Co-authored	None	82	78.8	39	88.6	40	70.2	0	0
		1-10	22	21.2	5	11.4	17	29.8	0	0
Journal publication	Authored	None	89	85.6	37	84.1	49	86.0	0	0
		1-10	14	13.5	7	15.9	7	12.3	0	0
		11-20	1	1.0	0	0	1	1.8	0	0
	Co-authored	None	93	89.4	43	97.7	47	82.5	0	0
		1-10	11	10.6	1	2.3	10	17.5	0	0
Funded research project	Proponent	None	103	99.0	0	0	56	98.2	0	0
		1-10	1	1.0	0	0	1	1.8	0	0
	Project member	None	102	98.1	0	0	55	96.0	0	0
		1-10	2	1.9	0	0	2	4.0	0	0

4.4. Correlational Analysis between Demographic and Academic Profiles

The relevance of the academic rank and highest educational attainment to the generation of research output can be seen by probing individual data of the academic faculty. Table 3 shows the demographic and academic profiles of selected academic faculty. In this study, some ECAs with completed post-graduate degrees did not participate in thesis advising and generate authored or co-authored conference presentations and journal publications. On the other hand, ECAs without a post-graduate degree may not be capable of generating any scholarly research outputs. MCAs may have academic ranks from instructor to professor levels as related to their length of service to the institution. It is observed that not all MCAs participate in thesis advising. Higher levels of post-graduate education for MCAs do not seem to present a trend of increased generation of research output. Lastly, LCAs were not able to cross to professor rank despite the lengths of service of more than 20 years. Primary reasons can be the non-production of any research output. These observations point to some possible generalizations on the relation between academic rank and highest educational attainment in the generation of research outputs.

Table 3. Demographic and academic profiles of selected academic faculty

Academic career level	Academic rank	Highest educational attainment	Length of service (years)	Frequency of research credentials [Authored (A) and Co-authored (C)]						
				Thesis advising	Institutional Conference		External conference		Journal publication	
					A	C	A	C	A	C
ECA	Instructor	Bachelor	> 5	0	0	0	0	0	0	0
	Instructor	Masters units	> 5	0	0	0	0	0	0	0
	Instructor	Masters	> 5	6-10	0	1-5	0	0	0	0
	Assistant professor	Doctoral	> 5	6-10	1-5	0	6-10	1-5	1-5	1-5
MCA	Professor	Doctoral units	< 20	1-5	1-5	1-5	1-5	1-5	0	0
	Associate professor	Doctoral	10-15	Above 20	0	0	1-5	0	0	0
	Associate professor	Masters	< 20	1-5	0	0	0	1-5	0	1-5
	Assistant professor	Doctoral candidate	5-10	Above 20	0	1-5	1-5	1-5	1-5	1-5
	Assistant professor	Masters	5-10	1-5	0	1-5	0	1-5	0	0
	Instructor	Masters	10-15	1-5	1-5	1-5	0	0	0	0
LCA	Associate professor	Doctoral	< 20	10-20	0	0	0	0	0	0
	Associate professor	Masters	< 20	1-5	0	0	0	0	0	0

Table 4 shows the correlational analysis among demographic profiles of age, academic rank, highest educational attainment, and lengths of academic service and R&D involvement. In the teaching-focused institution, it is observed that there are strong positive correlations [$0.7 < r \leq 1.0$ (Ratner, 2009)] between age and academic length of service ($r = 0.7720$) and between academic length of service and academic rank ($r = 0.7922$). This finding implies continuous service and academic progression within the employment of the academic faculty in the institution. From these findings, it may be deduced that academic progression in teaching-focused institutions can be pursued through continuous employment. Both the highest educational attainment ($r = 0.6372$) and length of R&D involvement ($r = 0.4244$) have a moderate positive correlation [$0.3 < r \leq 0.7$ (Ratner, 2009)] with academic rank. Highest educational attainment is more moderately positively correlated with academic rank rather than

length of R&D involvement. This implies that research involvement exhibits less contribution to the academic progression of the academic faculty unlike the highest educational attainment. Other promotional criteria (e.g., teaching, extension, and professional development) may have been utilized in the academic progression instead of scholarly research output. There is also a moderate positive relationship between lengths of academic service and R&D involvement (r = 0.3511). This low correlation indicates that research productivity may be in the low-tier priorities of the academic faculty for academic progression in the institution.

Table 4. Correlational analysis among demographic profiles. All computed p values for the data set are below 0.001.

Demographic profile	Pearson's correlation coefficient, r			
	Academic rank	Highest educational attainment	Length of academic service	Length of R&D involvement
1. Age	0.6768	0.5998	0.7720	0.3511
2. Academic rank	1.0000	0.6372	0.7922	0.4244
3. Highest educational attainment	0.6372	1.0000	0.6613	0.5232
4. Length of academic service	0.7922	0.6613	1.0000	0.3597
5. Length of R&D involvement	0.4244	0.5232	0.3597	1.0000

In this study, correlational analysis has also been employed to further investigate the relationship between demographic and academic profiles (see Table 5). Specifically, the relationship between academic rank, highest educational attainment, and length of R&D involvement to the quantity of theses advising, conference presentations, and journal publications has been determined. It is observed that the academic rank, highest educational attainment, and length of R&D involvement of the faculty all have moderate positive correlations with the thesis advising only (r = 0.3805, 0.4980, and 0.4700, respectively). As a teaching-focused institution, both ECAs and MCAs use thesis advising for R&D involvement. On the other hand, there were only weak correlations between the aforementioned demographic variables and the generation of research presentations in conferences and journal publications. This implies that higher levels of academic rank and graduate education minimally enhance the generation of scholarly outputs in a teaching-focused institution.

Table 5. Correlational analysis between demographic and academic profiles. All computed p- values for the data set are below 0.001.

Research credentials	Pearson's correlation coefficient, r			
	Undergraduate thesis advising	Authored (co-authored) scholarly output		
		Institutional conference	External conference	Journal publication
1. Academic rank	0.3805	-0.0825 (0.1844)	0.2542 (0.3216)	0.1811 (0.3946)
2. Highest educational attainment	0.4980	0.1694 (0.3071)	0.2780 (0.2431)	0.1466 (0.2459)
3. Length of R&D involvement	0.4700	0.276 (0.2642)	0.475 (0.3993)	0.2303 (0.3982)

4.5. Comparison to Other Studies

Overall, half of the faculty members from ECAs and MCAs have not been involved in research. Less than 20% of ECAs and MCAs were shown to produce authored and co-authored research presentations in conferences and journal publications. This study presents a case of a teaching-focused institution in the gestation stage of research and development growth. Several studies have reported that the low research productivity from Philippine SUCs stems from a lack of the following research enablers: leadership among research managers (Gamuza & Pacolor,

2019; Orale, 2014), research culture embraced by the academic faculty (Cerado & Naanep, 2023) incentive systems (Esponilla, 2015) and research funding (Ambong et al., 2022).

From the academic career levels in the teaching-focused institution being studied, a considerable percentage of MCAs are involved in research (31 or 29.8%), while there was a low percentage for ECAs (11 or 10.6%) and LCAs (2 or 1.9%). A total of 44 academic faculty members (42.3% of 104) were involved in research. A minority of 34 (32.6%) and 24 (23.0%) academic faculty have research presentations at institutional and external conferences, respectively. For the past three years, the HEI in this study was able to produce an annual average of 55 research presentations at an institutional conference. There were only 15 (14.4%) academic faculty members who have published in journals. If compared to another research-intensive institution with SUC level II (Monsura, Dizon, Tan Jr, Gapasin, & Testor, 2022), an average of 129 faculty members (19.6% of 659 academics) were involved in research and were able to generate an annual average of 93 conference presentations and 39 journal publications for a period of four school years. If compared to another research-intensive institution with SUC level III (Esponilla, 2015), 67% of its academic faculty (48 out of 71 faculty members) at a college level involved in research activities translated their research into 56 research presentations at conferences and 144 journal publications.

4.6. Proposed Model for Research Productivity across Academic career Stages

Previous data have observed that the research involvement of the academic faculty enhances with the transition from ECA to MCA and declines from MCA to LCA. Figure 1 shows the histogram of the quantity of faculty involved in thesis advising, conference presentations, and journal publications across academic levels. It is observed that a Gaussian distribution becomes pronounced with the occurrence of research productivity across academic levels. The tails of the Gaussian distributions are exhibited at ECAs at LCAs at the onset of the rise and fall of research productivity. On the other hand, the peak of the curve is observed at the MCAs which are the cohort that is evident for generating research productivity for the organization.

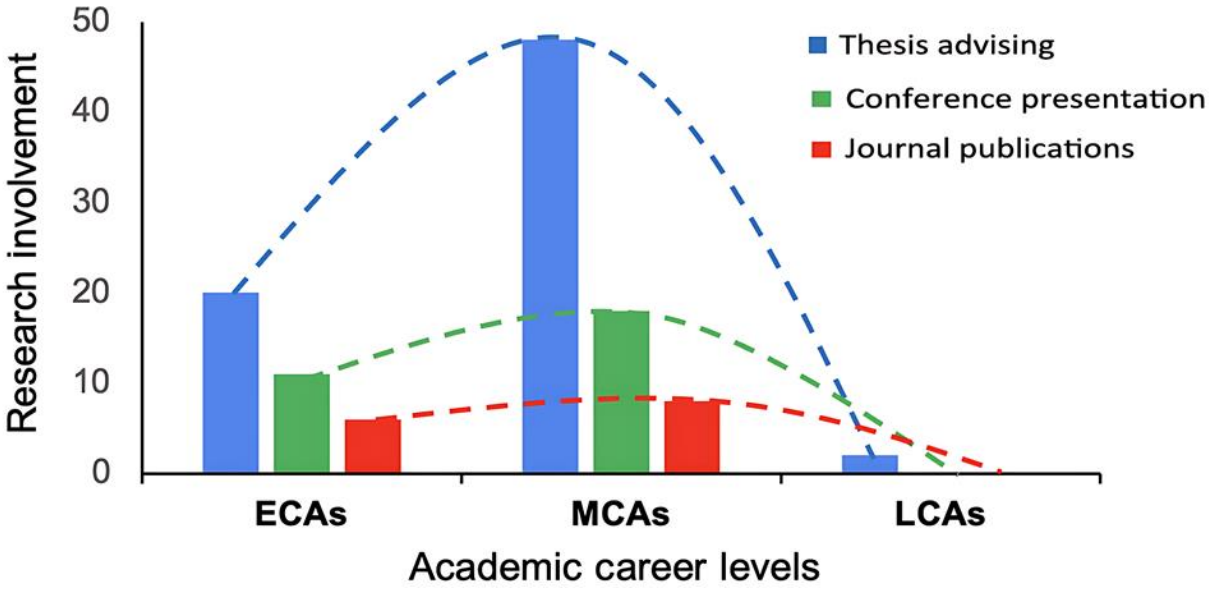

Figure 1. Histogram of the number of academic faculty involved in thesis advising, conference presentations and journal publications across academic career levels.

Figure 2 shows the proposed model for the stages of academic research productivity observed in the study. For a teaching-focused institution, the stages of academic research productivity are composed of the following: (a) short periods of a rise and fall of research productivity in early- and late-career academic progression, respectively, and (b) a long period of optimizing research productivity in the mid-career of academic progression.

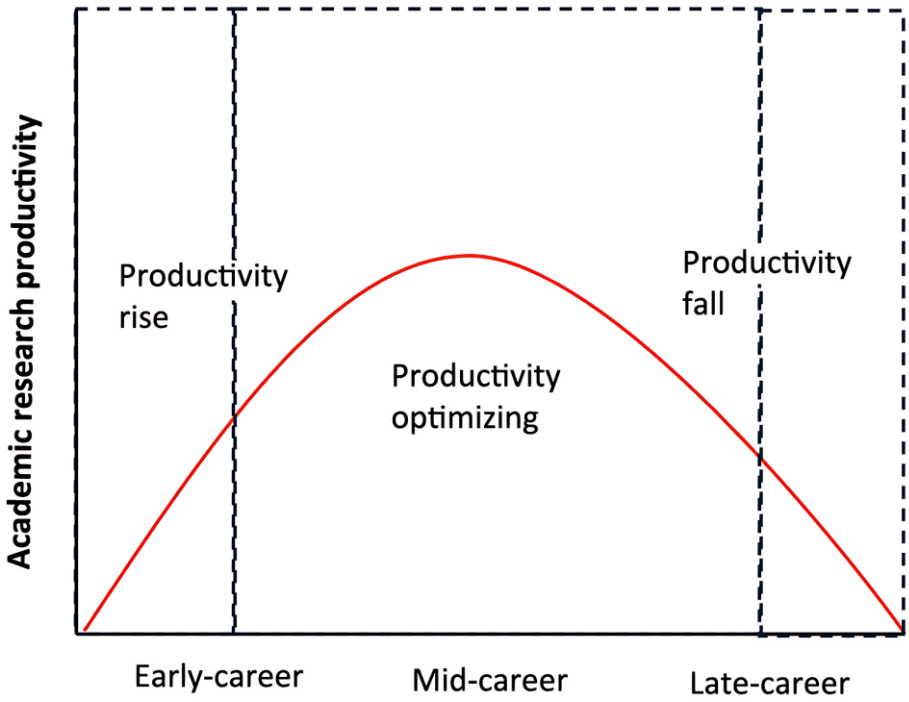

Figure 2. Bell curve of research productivity: a proposed model of academic research productivity across academic career stages.

The rise and fall of research productivity with the transitions from ECAs to MCAs and from MCAs to LCAs, respectively, represents a bell curve (see Figure 2). The MCA optimizes research productivity until the decline phase with the impending retirement of the academic faculty. The skewness or saturation of the research productivity during the mid-career stage of academic research productivity greatly depends on the research behavior of the faculty. For MCAs, the skewness of the research productivity will lean on the right or left of the academic faculty depending on the slow or fast growth of their research productivity, respectively. A fast-paced growth of research productivity may provide administrative opportunities to the academic faculty which can cause a sudden decline in research productivity. On the other hand, plateauing or saturation of research productivity will occur if the academic faculty maintains a certain level of production of scholarly outputs throughout the mid-career stage of academic progression. In comparison to research-intensive institutions, higher levels of research productivity would be observed in comparison to a teaching-focused institution. Future studies should be conducted to verify the validity of the proposed model.

Moreover, a strategic and sustained human resources plan is suggested to support a meaningful assimilation of research culture in HEIs. In particular, a three-level development architecture can be designed to cover the expansion, gestation, and maturation stages of institutional research culture (Olvido, 2021) while simultaneously banking on the academic research productivity stages of faculty members (see Figure 2). This may include the conduct of technical writing skills and research communication skills to develop the proficiency of ECAs in the expansion stage/productivity rise stage, the provision of research writing leaves and conference travel grants as MCAs build their scientific productivity and networks in the gestation stage/productivity optimizing stage, and the creation of research mentoring and employee resource groups to give LCAs a formal platform to share experiences and expertise on research management in the maturation stage/productivity fall stage.

The planning and development of human resources in HEIs has been generally considered to be poorly established [Pellert, 2007, as cited in Nestorowicz and Park (2014)], given the unique challenges of the university context. Human resources development is mainly practiced indirectly and in a fragmented, even cursory manner.

Having a thorough, deliberate human resources development plan can cultivate an environment where academics in all stages of their careers feel supported and valued. Developing the methodical competence of ECAs,

the self-confidence and social competence of MCAs, and the management competence of LCAs are pivotal to building a research culture in HEIs. Ultimately, an institution with a reputation for research, one that is invested not only in the research output of its faculty members but also in their overall academic development can drive both employee and institutional excellence.

5. CONCLUSION

This study presents the stratification of research productivity across the academic levels of a teaching-focused institution in the Philippines. It shows that a large portion of the faculty roster is composed of ECAs (42% out of 104), who are expected to contribute minimal scholarly research output. It also shows that a minority of MCAs and LCAs exhibit minimal levels of research productivity despite their academic progression in the institution. Less than 10% of the academics were able to generate journal publications. As a teaching-focused institution, both ECAs and MCAs largely use thesis advising for R&D involvement. In a teaching-focused institution, MCAs are expected to be engaged in thesis advising. A big majority (86%) of the MCAs are already involved in undergraduate thesis advising. However, only 21.1% of the MCA have been able to advise more than ten theses even with a period of more than five years of their academic service. Half of the ECAs have participated in thesis advising while all LCAs have experience in thesis advising. However, there was limited translation of student theses into actual dissemination of knowledge, particularly presentations in conferences and journal publications. Understanding the stratification of research productivity among academic career levels allows for the matching and customization of effective faculty development programs.

In this teaching-focused institution, correlational analysis shows that age and length of academic service are strongly correlated (r = 0.77). These findings imply that the continuous service of the academic faculty to the institution provides opportunities for academic progression. However, it was observed that higher levels of graduate education have a higher degree of correlation to academic rank (r = 0.52) in comparison to the length of R&D involvement (r = 0.64). This implies that the HEI has largely relied on other promotional criteria (e.g., teaching, extension, and professional development) for its faculty members' academic progression instead of scholarly research output. Similarly, correlational analysis shows a moderate positive correlation between academic rank and research productivity, specifically for thesis advising (r = 0.38) and external conference presentations (r = 0.32). A teaching-focused institution may be described as having a minority of ECAs and MCAs involved in generating research outputs and minimal research involvement with LCAs.

6. POLICY IMPLICATIONS

Contrary to expected outcomes from state policies on higher education, the experience of the teaching-focused HEI under investigation reveals that completion of advanced post-graduate degrees does not strongly correlate with the generation of research outputs. Similarly, progression in the academic ladder does not appear to be a good indicator for higher levels of research productivity as the analysis has shown. These findings underscore the need to revisit certain state policies, particularly about academic promotion in SUCs to prioritize research productivity more in promotions and the provision of incentives. A parallel initiative to ascertain the root causes of low levels of research productivity must be conducted to help guide measures in creating an enabling environment and instituting a proper research incentive structure for scholars. Faculty development programs for teaching-focused institutions must also prioritize upskilling and reskilling initiatives that are tailored to the specific career stages of faculty members. On the other hand, institutional policies should consider relevant hiring guidelines for ECAs based on research productivity instead of traditional employment qualifications of previous academic rank and post-graduate degree completion. Strategic and sustained career development plans and research collaboration activities may also be considered in improving the research productivity of MCAs and LCAs, respectively.

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Institutional Review Board Statement: The Ethical Committee of the Philippine State College of Aeronautics (PhilSCA), Philippines has granted approval for this study on 15 May 2024 (Ref. No. RDC-001-2024).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
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