

Institutional capacity, faculty capability, and research productivity in higher education institutions: A moderated mediation model

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Abstract: A strong research culture serves as a catalyst for the fulfillment of educational institutions' vision and mission. Predicated on the positivistic paradigm, the paper determined the role of research capability as a mediator in the relationship between institutional capacity and productivity in the research of HEIs' faculty in one province in the central Philippines. The paper employed descriptive and moderated mediation analyses utilizing the Research Capacity, Capability, and Productivity Metrics (RCCPM) for data collection. Forty-three HEIs and 356 faculty respondents participated in the study. Findings revealed that the faculty perceived HEIs' institutional capacity in research and their capability in research as moderate. Conversely, research production was extremely low. Applying the mediation analysis, institutional capacity influences faculty capability in research, which in turn impacts research productivity. Based on the findings, HEIs, together with allied agencies, need to boost faculty knowledge and skills in research to ensure improved productivity in research.

Keywords: *Institutional capacity, Mediation model, Productivity, Research capability.*

1. Introduction

Today's enormous, complex, and vital issues implore higher education institutions (HEIs) to move from the periphery of their instructional functions. On top of the fundamental purpose of providing skilled personnel and credible credentials, they position themselves as information and creative thinking sources, agents of mobility and advancement, contributors to social and cultural life, and drivers of individual and social well-being. This prevailing discourse on the role and purpose of HEIs places them in a frame of competitive necessity to partake in the origination and generation of knowledge.

Within this framework, colleges and universities have been invoked to engage, compete, and cooperate at the highest levels in broader society and economy through their research productivity. The Quacquarelli Symonds World University Ranking underscores research impact gauged through citations, H index, linkages, and weightings as a major criterion in selecting the world's top universities [44]. Parallel to this, the highest level of accreditation for colleges and universities in the Philippines requires strong research and publication projects that are internationally disseminated, acknowledged, and utilized for policy-making and improvement of teaching and learning methodologies [1]. Alongside, the Accrediting Agency of Chartered Colleges and Universities in the Philippines, Inc. highlights the institution's involvement and the faculty's involvement in research [2]. The Commission on Higher Education (CHED) developed the National Higher Education Research Agenda (NHERA), which also highlights the necessity of advancing and supporting research in the nation's 1605 public and private HEIs [3]. These conditions situate the Philippine HEIs amid an increasing challenge to beef up their research and innovation capacity to stand out and remain competitive.

In light of this reality, the slipshod thinking about the research function that colleges and universities can play seemingly leads to the demands that they seem cannot satisfy while shrouding

their purpose and, in the process, undermining their potential. While research is recognized as an indicator of performance, HEIs paradoxically do not invest enough in it. The insufficiency in funding research and innovation undertakings is portrayed in a bigger scene. The country had the lowest research and development expenditure, corresponding to 0.32% of the Gross Domestic Product (GDP) percentage in 2018 [4]. Consequently, the country placed 73rd of 127 economies in the 2017 Global Innovation Index, which computes an economy's performance innovation-wise using innovative and creative outputs [5]. The most recent status of the country continually reveals a similar picture with R&D expenditure of 0.324 percent of GDP, which is significantly lower than the average global average of 2.04 percent and the UNESCO benchmark of one percent [6].

Participation in research among faculty members revealed a low turnout based on the Philippines' HEI typology. According to Salazar-Clemeña and Almonte-Acosta [3] just two HEIs in the sample fulfilled the standards for the doctoral/research categories, and only 15 HEIs out of 223 HEIs surveyed and appraised satisfied the requirements for the graduate-capable HEI category. This data shows that most of the HEIs in the country are teaching but not doctoral or research institutions. The poor research output of most colleges and universities mostly accounts for the failure to optimize the utilization of research funds, limited incentives, and inadequate technical support [7]. According to Sanyal and Verghese, cited in Alcazaren and Robiños [8] universities in developing countries have excellent teaching skills but poor productivity in terms of producing groundbreaking and novel research.

The exigency of enhancing the research culture encompasses the development of abilities to conduct and perform research effectively, efficiently, and sustainably at the levels of individuals and institutions. Apparently, this casts a shadow on the system of higher education. HEIs are believed to be the stronghold of wisdom and highest expertise. Yet, they have been so far minimal in realizing their goals, particularly in enhancing the research capability of their human resource. Teachers won't be able to conduct, use, or share research without the needed capability [9].

In light of the preceding discussions, it is forthright to ask: Do HEIs reveal a strong capacity to support faculty research? Does institutional capacity influence faculty productivity in research? Does the faculty of HEIs possess the needed capability to conduct research? Can research capability mediate the relationship between institutional research capacity and faculty productivity in research? These essential questions all point to the reexamination of the incumbent research environment of the HEIs – their attributes, human capital, and productivity. Getting into the root of the matter, the faculty being the primary producers of research and innovations are at the crux of the emphasis.

While the study findings should not be interpreted as direct evidence of any causality between variables, they point to possible connections that deserve consideration. The faculty in higher education institutions performs three roles at the very least – teaching, research, and community service. The condition brings the faculty to face the subsequent trade-off between offering quality instruction, producing high-quality research, and participating in community extension activities. These expected roles often cannot co-exist in a synergistic balance and leave the faculty in a defenseless and confounding position.

All of the problems above are linked together. These alarming realities of poor research productivity demand careful analysis. Currently, the majority of the literature examines the external evaluation of HEIs' research performance based on the findings rather than looking inward to examine the relationship between teaching and research to understand faculty functions and productivity better. Accordingly, there is a lack of studies within certain educational contexts that explore the factors that either promote or hinder research productivity, particularly from the perspective of the faculty [10]. Objective and empirical data that can guide and touchstone in initiating capacity and capability-building programs in research are incomplete, if not missing. Essential questions and issues surrounding the HEIs' poor research culture remained unaddressed and unanswered. All of them need a firm understanding of the root causes of the limited publication problem in order to be effective. Since faculty members are supposed to be the first to conduct research and produce articles that can be published,

trying to fix the issue without taking their perspective into account may be futile.

On this ground, the terminal aim of this study was to use the faculty members' perspectives and assessments to draw a clearer representation of the institutional capacity, faculty capability, and productivity in research. The paper paid close attention to the connection between these variables, particularly the role of research capability as a mediating factor between institutional capacity and faculty productivity in research. Consequently, the paper ended with a constructive discourse and rendered practical recommendations for a more enhanced research capacity that befits the epithet of the HEI's research culture.

2. Literature Review

2.1. *Research as a Function of Higher Education Institutions*

Research and innovation are vital to combat poverty and strengthen economies and societies. Developing countries must have the expertise and experience required for research and innovation to achieve sustainable progress [11]. Toward this realization, governments, corporations, and international organizations must collaborate to invest in research facilities, education, and infrastructure to create an environment that nurtures research and development [12]. Research serves as a key driver in the origination of knowledge and creative solutions to problems at the national, regional, and global levels [13].

Accordingly, institutions of higher learning can significantly contribute to this undertaking [14] as they serve as venues for innovation and research, generating novel concepts and ideas. Higher education institutions (HEIs) in the Philippines are mandated to prioritize research and innovation through Memorandum Order No. 52, a 2016 series issued by the Commission on Higher Education. Establishing and nurturing a research and innovation culture among stakeholders is essential for HEIs to provide concrete results that may be used for industry-related enhancements and novel market prospects while tackling the most critical national challenges [15].

Research also carries an overriding value for higher education institutions. The research performance of research-intensive universities has a big impact on their reputation [16]. Research-active institutions contribute to the growth of human knowledge while producing new concepts, methods, and technologies. The impact and output of its research raise the institution's profile internationally and attract top talent, partnerships, and collaborations.

2.2. *Higher Education Institutional Capacity to Support Research*

Enhancing research capacity in an emerging research institution requires evaluating research management systems and identifying adaptive practices to support the institution's evolving research agenda [17]. HEIs must upgrade their organizational policy and system, technology and infrastructure, and means and resources to advance research capacity in developing nations [18]. This capacity is important for developing an institution-wide research, creativity, and knowledge-generation culture.

UNESCO, during the forum for scholars and decision-makers, identified human capability, infrastructure, and investment as the main pillars of research systems [13]. Appropriately, universities need to establish systems, devise schemes, and pursue specific strategies Fisher [19] to ensure that the needs and requirements for enhanced system support for research are addressed.

In this study, the operational and management system that facilitates research production in an HEI is labeled logistics. The term generally applies to the detailed organization and implementation of complex operations or activities that relate to laying out and implementing policies and norms, provisions and support mechanisms, and a conducive research environment. Logistics address the strategic planning, coordinating, and organizing of the many tasks, materials, and procedures involved in organizing, carrying out, and supervising research projects in academic settings. It entails managing every facet of the research process effectively and efficiently to guarantee that projects are finished properly, on schedule, and within budget.

Good logistics in research can begin with clear policies, norms, and standards for research. They guarantee that research activities align with the institution's objective and constructively contribute to society by offering the structure, guidance, and standards required to increase institutional research capacity. These policies and standards can be a concoction of best practices that can guide research credit allocation and collaboration, incorporate research into faculty performance evaluation and rankings, enhance external partnerships, and support research consultation, training, and related services [20]. The research conducted by Dacles, et al. [21] provides evidence to support this hypothesis. It shows that the existence of institutional research policies, guidelines for financial rewards and merit systems, and research capability programs contribute to developing a strong research culture among faculty members in the research locale.

Grounded on this discourse, the provision of the needed logistics calls for stronger leadership support for the faculty's research endeavor. The study by Khan, et al. [22] found that transformational leadership has a strong impact on intrinsic motivation and work performance. Suggestively, Leadership support in terms of logistics can help increase the faculty members' productivity in research.

Another significant aspect brought up in this study is the involvement of faculty and staff in research and the development of their research capacities due to funding issues. Funding sustains researchers' livelihoods and is a prerequisite for nearly all research [23]. A sufficient budget is also required to access vital resources in research like cutting-edge machinery, study materials, and specialized software. Researchers could find it difficult to conduct experiments or analyses at the caliber necessary for high-quality research if they lack the necessary tools.

The present institutional and national financing levels for research and research training can impact university research activity [24]. These effects were noted in the types of research conducted, the support for research dissemination, and the merits of pursuing global research and development. Sufficient funding that can be allocated expressly for staff training in research, publishing rewards and incentives, conference attendance and paper presentations, collaborative research, and scholarships are all necessary for research. It is expected that funding will have an impact on the quality of topics that are studied as well as the breadth, depth, direction, results, and even possible effects of public research [25].

Additionally, strong research infrastructure must be invested in and maintained to promote scientific advancement, stimulate innovation, and handle difficult issues that call for cross-disciplinary collaboration. Research infrastructure refers to the buildings, facilities, supplies, laboratory, space and equipment, resources, and services required for scientific and technological research operations [26-28].

Scientific communities require research infrastructures to conduct extensive studies in frontier areas. They are essential to the effectiveness, inventiveness, and global competitiveness of science because they provide a plethora of services and opportunities for study [29]. They give researchers the best tools and resources to innovate, create cutting-edge innovations, solve global issues, and accelerate the shift to a greener, more digital economy [10]. Investment in infrastructures, strategies, and robust assistance for research supports university research and makes it possible for them to compete globally [30] successfully.

2.3. Faculty Capability in Research

Faculty capability in research describes the extent to which a faculty demonstrates skills and the ability to perform relevant research. This capability covers conceptual knowledge, technical knowledge, and people skills.

In conceptual knowledge, researchers need to comprehend and be aware of how scientific information is conceptualized. It enables them to defend their methodological decisions and create internal consistency in their research endeavors [31, 32]. Concerning this, conceptual knowledge is essential to research because it allows researchers to comprehend their topic's fundamental ideas and concepts [11]. It enables them to apply the knowledge and intellectual abilities needed for specific research activities. It encompasses more than just knowing the facts. It also involves understanding

the underlying frameworks, theories, and principles that form the basis of a particular field of knowledge.

Conceptual knowledge is frequently linked to the researcher's capacity to synthesize, analyze, and apply abstract ideas. Gaining conceptual knowledge is like having the key to open new vistas of understanding when exploring the complex network of inquiry. It is a compass that helps scholars navigate the maze of intricate ideas and approaches with clarity and purpose. Through deliberate recognition of the foundations of conceptual knowledge, researchers lay the groundwork for thorough and perceptive assessments as well as a solid platform for their investigations [31, 33, 34].

Technical skill, on the other hand, describes a collection of particular aptitudes and expertise that scholars need to research a topic or profession successfully. These abilities extend beyond basic research skills and frequently entail thoroughly comprehending the methods, resources, and strategies pertinent to a specific technical or scientific field. It comprises the practical, mechanical, information technology, and mathematical or computational skills to complete the tasks required to conduct research [35].

Besides conceptual knowledge and technical skills, the researchers' ability to interact and collaborate with others is deemed important. Strong people skills facilitate effective communication, teamwork, and collaboration, leading to more fruitful research outcomes. In fact, the development of soft skills through collaborative processes has received more attention than the development of technical abilities. The process of mutual learning and inquiry fosters the improvement of soft skills like critical thinking, effective communication, teamwork, and the ability to plan and organize as well as solve problems [36].

In this context, people skills are the faculty researcher's ability to get along with others while undertaking research. It describes how they interact with each other. It is considered a plus factor when they work with collaborators and other partner colleges/universities or agencies. It is a collection of attributes that support productive relationships with others. As expected, they work with colleagues, students, and external collaborators on interdisciplinary initiatives and projects.

2.4. Faculty Productivity in Research

Research productivity is multifaceted, and different fields and research contexts may have different ways of measuring it. This bibliometric analysis can determine research productivity and the quantity of publications in a specific research field [37]. Articles, reviews, conference papers, and other academic publications fall under this category. Moreover, the impact and influence of a researcher's contributions to the field can be determined by counting the instances in which other researchers have mentioned their work. A metric that combines citation impact and productivity is called the h-index [38]. The measure pulls data from publications indexed in the Web of Science (WoS). It offers abstracts, citation metrics, author details, references, affiliations, country information, and the journal impact factor [39].

2.5. Theoretical Basis

A quick review of available indicators reveals the debilitated accomplishment of the HEIs in research. Although certain areas have revealed positive trends and progress, development patterns remain predominantly unsustainable and sporadic. It is insufficient to assume that a bigger investment can increase research productivity. The impasse requires a clearer and sharper vision of the "whereto" of any plan of action the institutions will take to improve their current status in research. In a bid to improve the research culture of the HEIs, there is a need to ascertain the institutional capacity, faculty capability, and productivity of research. Likewise, it presupposes the redirection and realignment of the institutional priorities and initiatives along with research to achieve the desired end.

Working from the base, the paper adopted methodological positions encapsulated within the positivist paradigm to address the specific questions advanced in the study. Positivism is a philosophical perspective of scientists who work with the observable reality within society and produce generalizations. Positive thinking emphasizes the significance of what is presented generally, with a

stricter focus on only considering facts and unadulterated data unfettered by human interpretation or bias [40]. If researchers follow positivism, this would lead to a situation where they would see a group of people or other associated social entities as real in the same way that they regard both natural and physical items as real.

Positivism has had a profound impact on current research, particularly in terms of using numerical data and analyzing aspects of individuals and institutions related to higher education institutions' research productivity. Its view suggests methodological thinking and shifts the domain from speculation to gathering empirical data directed towards quantification and using statistics and appropriate computational procedures.

Statistical patterns represent recognizable forms of action and thus serve as a basis for sociological generalization. This methodology stresses empirical observation and a degree of approximation in research. A value-free science calls for investigating causes and consequences, creating ideal types that would allow for separating institutional norms and deviations from them, and, most importantly, creating typical causal relationships [41].

Under the auspices of this theory, the paper considered the analysis of the personal and environmental conditions that sustain and support the research productivity and achievements of the faculty. The researcher adopted the descriptive-correlational design. It was assumed that there were restraints to research productivity that can nest within individual or organizational strains. The researcher explored and described the problems and charted the direct and mediating links between institutional capacity, faculty capability, and productivity in research. The design correspondingly dictated developing meaningful questionnaires, conducting a pilot study, ensuring the representativeness of sample size for factorability, and providing accurate and meaningful quantitative data analysis. Incorporating the positivist stance also put forward complex mediation analyses that generally prioritized quantitative data to form descriptions and illustrate causal relationships between variables covered in the study.

Appropriately, there is a need for an enabled human and capacitated environmental resource if research is to flourish. Linkages between the human and environmental factors that shape the broader operating context of the HEIs research culture must be examined. Strategic directions that will steer the subsequent actions that respond to imperatives and contemporary pressures, along with research achievements, may be realized in this study. Taking an even-handed look at HEIs' current research context and status made a good start.

3. Methods

3.1. Research Design

Drawing from the positivist paradigm, the researcher adopted a quantitative descriptive-correlational design. It allowed the researcher to gather data that will offer a description of the HEIs' institutional capacity to support faculty research, faculty capability, and productivity in research. Given the descriptive findings, the researcher conducted a more in-depth analysis of the data to demonstrate the direct causal link between the institutional capacity to support faculty research and faculty research productivity, as well as to illustrate how this link is mediated by faculty research capability.

3.2. Respondents of the Study

Data was sourced from 356 faculty respondents representing the 43 HEIs covered in the study. They were randomly selected using the proportionate stratified sampling method. The sample size strata representing each group of HEIs is proportional to the relative size of that stratum in the population.

3.3. Data Collection

The validated and reliability-tested instrument called Research Capacity, Capability, and Productivity Metrics, or RCCPM, was used to gauge the institutional research capacity, faculty

capability, and productivity in research. The instrument was validated by 10 doctorate degree holders in education from different universities and colleges with proven expertise in research, educational management, and test construction using the Lawshe Criteria. A total of 9 items obtained a content validity ratio lower than 0.80 and were automatically removed from the final instrument. The Cronbach's alpha result for the test of internal consistency earned the results of 0.87, 0.83, and 0.91 for the three areas measured. The institutional capacity reflects items that measure the extent to which the HEI can provide the needed logistics, infrastructure, and budget to support faculty research. The faculty capability includes items that reveal the faculty's conceptual, technical, and relational skills in doing scholarly or scientific research. The faculty research productivity reflects the aggregate score representing the number of research, innovations, and inventions completed, presented, published, and utilized.

3.4. Data Analysis

Frequency count, percentage, and mean were used for descriptive questions on the levels of institutional capacity, faculty capability, and productivity in research. Mediation analysis was applied to verify the direct and indirect causal relationship between institutional capacity, faculty capability, and productivity in research. Assumptions related to the typology, homoscedasticity, normality of data, linearity, independence of observations, and absence of significant outliers were addressed prior to the inferential analysis. The researcher also ensured full commitment to a high standard of professionalism by considering the fundamental ethical principles of undertaking research.

The HEIs generally manifested a moderate level of institutional capacity as reflected in the weighted mean (W.M.) of 2.61. The area of logistics (WM=3.03) earned the highest weighted mean, interpreted as moderate, while provision for funding (WM=2.38) and infrastructure (WM=2.42) was found to be low. The standard deviations (S.D.) in the areas of logistics (SD=0.81), funding (SD=0.77), infrastructure for research (SD=0.84), and the overall institutional capacity in research (SD=0.77) show that the earned scores were not too spread out from the computed averages. The HEIs with low (34.88%) and very low (18.60%) budget support correspondingly represented a total of 53.48% or 23 out of 43 colleges and universities under study. A parallel result is revealed in the area of infrastructure for research, where a total of 53.49% (37.21% + 16.28%) of the HEIs obtained low and very low mean ratings. The low results indicate that the stated indicators to gauge budget support and infrastructure for research were minimally and inconsistently met in some respects. Much improvement to boost support in these two areas is required for the complete realization of research capacity. The inadequacy of grants, high-end equipment, and facilities appeared to be the foremost factors among the surveyed HEIs. These factors consequentially appended potential constraints for the studied HEIs to support faculty engagement in research.

While instruction is the primary service delivered by HEIs, they need to prepare the ground for the research activities of their faculty members through the placement of policies, the creation of a positive climate, and supporting allocations for research [42]. Along with these expectations, it appears that research is one core activity that is being ostensibly neglected in most colleges and universities in the country. Aligned to this claim, Napoleon K. Juanillo of the Commission on Higher Education identified the lack of institutional support and inadequate institutional infrastructure as some of the main causes of the low research performance of Philippine HEIs [43]. The poor turnout in research of most colleges and universities mostly accounts for the failure to optimize the utilization of research funds, limited incentives, and inadequate technical support [7].

The insufficiency in funding research and innovation undertakings is also portrayed in a bigger scene. According to the Philippine Development Plan Report for 2023–2028, the country's research and development (R&D) investment was found to be insufficient. The nation's gross R&D spending is now at 0.324 percent, which is significantly less than the 1.0% and the 2.04 percent world average benchmark by the United Nations Educational, Scientific, and Cultural Organization [6]. Consequently, the country placed 73rd of 127 economies in the 2017 Global Innovation Index, which

computes an economy's performance innovation-wise using innovative and creative outputs [5].

Gleaned from the findings, the HEIs need to look into their current provision of budget support and infrastructure for research to identify schemes and strategies that will enhance their capacity to support faculty research. According to Neema and Chandrashekar [44] the infrastructure and funding that are available to perform the research also play a role in how successfully the research endeavor is carried out. Funding is necessary to fulfill these requirements because conducting a research study involves expenditures and material requirements. If the researcher or institution has the necessary infrastructure in place, many research projects can be carried out even without any external funding. Simply put, the provision of budget support and infrastructure must be embedded and be made part of the HEI's way of institutional life to support and develop the capabilities of the faculty members in pursuing scholarly research. These aspects represent how people and resources are brought together to accomplish institutional targets of rich research produced.

4. Results and Discussion

4.1. Institutional Capacity to Support Faculty Research

The HEIs generally manifested a moderate level of institutional capacity as reflected in the weighted mean (W.M.) of 2.61. The area of logistics (WM=3.03) earned the highest weighted mean, interpreted as moderate, while provision for funding (WM=2.38) and infrastructure (WM=2.42) was found to be low. The standard deviations (S.D.) in the areas of logistics (SD=0.81), funding (SD=0.77), infrastructure for research (SD=0.84), and the overall institutional capacity in research (SD=0.77) show that the earned scores were not too spread out from the computed averages. The HEIs with low (34.88%) and very low (18.60%) budget support correspondingly represented a total of 53.48% or 23 out of 43 colleges and universities under study. A parallel result is revealed in the area of research infrastructure, where 53.49% (37.21% + 16.28%) of the HEIs obtained low and very low mean ratings. The low results indicate that the stated indicators to gauge budget support and infrastructure for research were minimally and inconsistently met in some respects. Much improvement to boost support in these two areas is required to realize research capacity fully. The inadequacy of grants, high-end equipment, and facilities appeared to be the foremost factors among the surveyed HEIs. These factors consequentially appended potential constraints for the studied HEIs to support faculty engagement in research.

Table 1.
Level of institutional capacity in supporting faculty research (N=356).

Scale	Logistics		Funding		Infrastructure		As a whole	
	f	%	f	%	f	%	f	%
	0	0.00	0	0.00	0	0.00	0	0.00
Very low	2	4.65	8	18.60	7	16.28	2	4.65
Low	10	23.26	15	34.88	16	37.21	17	39.53
Moderate	16	37.21	19	44.19	16	37.21	17	39.53
High	14	32.56	1	2.33	4	9.30	7	16.28
Very high	1	2.33	0	0.00	0	0.00	0	0.00
Weighted mean	3.03		2.38		2.42		2.61	
SD	0.81		0.77		0.84		0.77	
Interpretation	Moderate		Low		Low		Moderate	

Note. Extremely Low – 0.00 to 0.49; Very Low – 0.50 to 1.49; Low – 1.50 to 2.49; Moderate – 2.50 to 3.49; High 3.50 to 4.49; and Very High 4.50 to 5.00.

4.2. Faculty Capability in Research

The faculty exhibited a moderate level of research capability (WM=3.30). This means that 41 to 60% of the required conceptual, technical, and relational competencies had been learned, acquired, and applied to pursue research activities. The biggest percentage of the faculty claimed that they possessed a moderate capability in research (48.03%). A meager portion affirmed they have a very high or greater

ability (7.87%) to conduct research. The composite scores for three areas disclosed a high level of relational skills (WM=3.53), a moderate level of conceptual knowledge (WM=3.29), and technical skills (WM=3.09). The faculty indicated 61 to 80% acquisition and application of relational competencies and 41 to 60% of conceptual knowledge and technical competencies. The obtained standard deviations across the competencies measured (SD=0.81 for conceptual, SD=0.84 for technical, and SD=0.75 for relational skills) denote that the scores were negligibly dispersed from each other nor significantly deviated from yielded averages.

Drawing from the overall results, the HEIs' faculty embodies the personal attributes and interpersonal skills that made them capable of engaging in collaborative work in research. There is, however, a need that signals an imperative augmentation in their conceptual and technical skills in the performance of related tasks and responsibilities. Salazar-Clemeña and Almonte-Acosta [3] arrived at the same findings, calling close attention to the faculty's readiness, competency, and experience in the conduct of research. They noted that many teachers in higher education, despite their obtained graduate degrees, still find research cumbersome. Salom [45] also found that most higher education faculty fell short of critical writing and research skills, specifically in collecting, analyzing, and interpreting data. Even professors at graduate schools tend to lack research experience.

It could be construed that the lack of training and academic experience can lead to inadequate competency that eventually lowers the confidence of the faculty to pursue research. The finding hinted that there is still an unremitting need for faculty to improve their knowledge and practical, mechanical, technical, and computational skills to perform research tasks successfully.

Table 2.

Level of faculty capability in research.

Scale	Conceptual knowledge		Technical skills		Relational skills		As a whole	
	f	%	f	%	f	%	f	%
Extremely low	3	0.84	0	0.00	0	0.00	0	0.00
Very low	47	13.20	10	2.81	1	0.28	1	0.28
Low	170	47.75	77	21.63	28	7.87	47	13.20
Moderate	106	29.78	151	42.42	155	43.54	171	48.03
High	30	8.43	97	27.25	126	35.39	109	30.62
Very high	0	0.00	21	5.90	46	12.92	28	7.87
Weighted mean	3.29		3.09		3.53		3.30	
SD	0.81		0.84		0.75		0.75	
Interpretation	Moderate		Moderate		High		Moderate	

Note: Extremely Low – 0.00 to 0.49; Very Low – 0.50 to 1.49; Low – 1.50 to 2.49; Moderate – 2.50 to 3.49; High 3.50 to 4.49; and Very High 4.50 to 5.00.

4.3. Level of Faculty Productivity in Research

Research productivity refers to innovative thoughts and ideas that, after theoretical and applied studies, lead to the publication of articles in leading journals, patent registration, or documentation [42]. In reference to this, the faculty productivity in research was determined based on the number of research completed, disseminated, published, and utilized that is assigned corresponding points for measurement and classifying them into an extremely low, very low, low, moderately high, high, and very high levels of productivity.

In Table 3, the gross mean rating of 22.01 is an expression of a remarkable and very poor engagement of the greater majority of the faculty in the research efforts and activities of their respective colleges or universities. In the aggregate column, the scores are mostly leaning to the bottom scale, with 242 faculty (67.98%) indicating an extremely low level of research productivity, 58 (16.29%) very low level of research productivity, and 21 (5.90%) low level of research productivity. Twenty-three faculty members (6.46%) exhibited a moderate level of research productivity. Only 12 (5+7) faculty members displayed very high levels of research productivity, which represents 3.37% (1.40%+1.97%) of the total 356 faculty respondents.

HEIs' faculty members, to an alarming extent, are laid-back and passive in their engagement in research production and publication. The low ranking of the country in research productivity compared to neighboring countries Vinluan [46] the lack of participation of Filipino researchers in international presentations, and the diminutive publication in a journal with a sterling reputation Saloma [47] are gleaming proofs of the very poor productivity in research among HEI faculty. From a more focused perspective, Malaga [48] study revealed the attainment of the lowest index in green research and innovation compared to other measured parameters for education sustainability. Delving into the major contributory factors to such findings, he further affirmed that budget support and poor linkages curbed the significant efforts of the faculty to produce research. The poor research capability of the faculty, inadequate infrastructure, and nearly absence of policy mandating compulsory faculty research were also identified as contributory factors to sunken productivity in research. The country is desolate and ill-prepared at present to cope with the accompanying challenges of advancement. In confirmation of this, the National Academy of Science and Technology Philippines National Academy of Science & Technology Philippine [49] reported that the government is not investing sufficient resources in science and technology (S&T), human resource development, research and development (R&D), and physical infrastructure. Academic institutions are also incapable of supporting scientists and technologists who venture into innovation-driven undertakings. As a result, there is a meager output of knowledge products, such as scientific publications, patents, and innovations. Publications in journals with a Scopus index and journals recognized by CHED accreditation are relatively low. There are typically a few faculty members who are involved in the presentation and publication of their completed research in respected journals [50].

Table 3.
Level of faculty productivity in research.

Scale	As a whole	%
	f	
Extremely low	242	67.98
Very low	58	16.29
Low	21	5.90
Moderate	23	6.46
High	5	1.40
Very high	7	1.97
Weighted mean	22.01	
SD	29.87	
Interpretation	Extremely Low	

Note: Extremely Low – 0 to 25.00; Very Low – 25.01 to 50.00; Low – 50.01 to 75.00; Moderate – 75.01 to 100.00; High – 100.01 to 125.00; Very High (V.H.) – 125.01 to 150.00.

4.4. Faculty Capability as a Mediating Factor Between Institutional Capacity and Faculty Productivity in Research

The result of direct effect (path c') shows that the direct effect of institutional capacity on faculty productivity in research was minimal and not statistically significant. ($E=0.02$, $SE=0.06$, $z=0.27$, $p=0.79$). Analyzing the indirect effect (path ab), results reveal that faculty capability in research significantly mediated the relationship between institutional capacity and faculty productivity in research ($E=0.51$, $SE=0.06$, $z=9.31$, $p<0.01$). The result indicated a complete mediation whereby the effect of institutional capacity on faculty capability in research was transmitted through faculty capability in research. The total effect (path c), partitioned into a combination of direct and indirect effects, shows that the institutional capacity positively predicted the faculty capability in research ($E=0.53$, $SE=0.07$, $z=7.64$, $p<0.01$).

Extant literature typically supports the general finding that greater human capital correlates with higher research productivity. Human capital explanations typically focus on individual resources such as education, skills, and training [51]. In 2009, a study by Wichian, et al. [52] found that the

researchers' characteristics, research competence, and institutional research-promoting characteristics were directly correlated with research productivity. Lertputtarak [53] added that self-motivation, essential skills, and experience are the fundamental drivers that encourage faculty to do research. The University's endeavor to promote research will be fruitless if there are no fundamental drivers despite the institutional effort to provide other supportive factors. Gambin and Green [54] stressed that skills largely influence innovation in the same context. Academic skills, research skills, and creativity are skills that enhance innovation activity and knowledge creation. Skill levels are related to productivity, where more highly skilled people produce more high-value goods and services more efficiently. In conjunction with this, Frantz, et al. [55] opined that policies and procedures, research budget, infrastructure and publication, rewards and incentives, and other institutional indicators are all external elements that can encourage characteristics encompassing knowledge, skills, and attitude that can strongly drive the individuals to produce more research.

Strengthening the preceding claims, Fernandez and Galache [56] study also showed that faculty members' research output was influenced by their attitudes and research-related skills. A detailed examination of the quantity of research completed found that greater research participation is correlated with greater research ability and experience. The lack of solid training that would make faculty or instructors consistent producers of research and, in response to the increasing desire to become an active contributor of information for the future of the industry, can be blamed for the little involvement of faculty in research activities [57].

In order for teachers to produce research, they must develop and improve their research skills. Accordingly, institutions and allied agencies must cooperate to help teachers gain and develop the information, skills, values, and positive attitudes that can enhance their worth as researchers [58]. Simply put, the institution's assistance in enhancing faculty research capability may lead to higher research production.

Table 4.

The mediating effect of faculty capability on the relationship between institutional capacity and faculty productivity in research.

Path estimates	Effects	Estimate	Std. error	z-value	p
Institutional capacity to faculty research productivity	Direct effect	0.02	0.06	0.27	0.79
Institutional capacity to faculty research capability to productivity in research	Indirect effect	0.51	0.06	9.31	<0.01
Institutional capacity to faculty research productivity	Total effect	0.53	0.07	7.64	<0.01

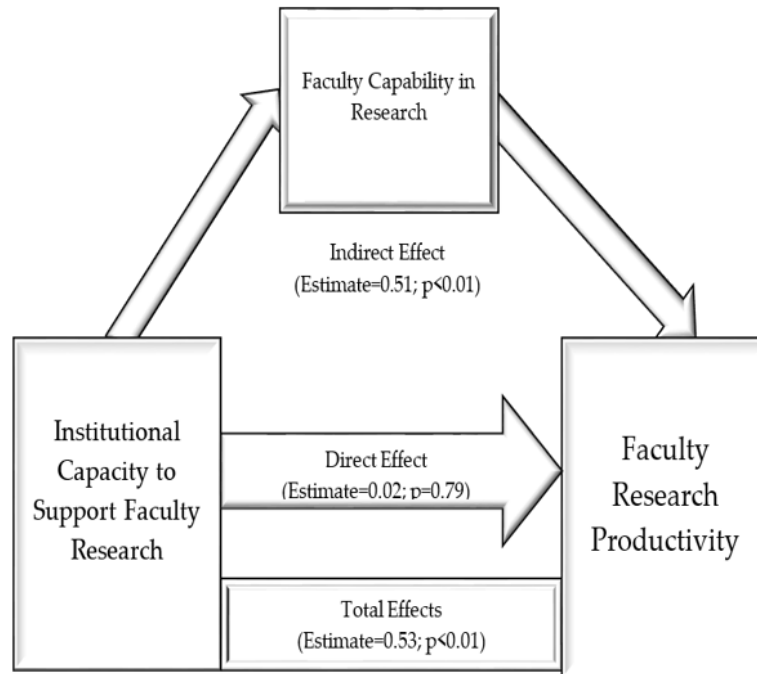


Figure 1. Moderated mediation model of faculty capability as a mediator between the institutional capacity and research productivity.

5. Conclusion

The acceptable level of institutional capacity in providing logistics in research is an essential boost to the research practices of the institution. Nonetheless, budget support and infrastructure areas are still outlying from the acceptable level. The results suggest a more thorough analysis and appraisal of the system and institution of norms and regulatory measures to integrate a sound research culture among HEIs.

The faculty members generally demonstrate desirable attitudinal and collaboration skills in research. Still, they have yet to enhance their knowledge as well as their practical, technological, mechanical, and computational skills to be fully equipped to conduct research. This correspondingly calls for the review of set policies and programs on instruction and research – its scope, coverage, and inclusion - and identifies areas that limit faculty engagement in research. Far-reaching reforms can be derived from a deeper scrutiny of the conditions and circumstances that circumscribe faculty proficiency and productivity in research.

The level of research productivity of HEIs' faculty is extremely far below the acceptable margin. The inadequate academic experience, nearly absence of logistics and funding support, and lack of research training impede faculty productivity in research. With the identification of factors elemental to the research productivity, the institution can focus on the formulation and institution of clear measures and procedures to enhance the participation of the faculty in the research undertakings of the college or University.

Taking a deeper analysis, the institutional capacity to support research consequentially influences the faculty members' productivity in research when mediated by research capability. Concomitantly, faculty members with adequate research skills, although not sufficient, can better contribute to the total research productivity of the college in terms of completed, presented, published, and utilized research. Based on these results, HEIs must instigate relevant efforts to improve system support and provision to address individual-capacity needs for more enhanced research productivity. The findings sensibly call

for a more enriched research environment that offers a fertile ground for research endeavors to grow and flourish.

HEIs may see the need to strengthen the components of logistics, budget support, and infrastructure to reinforce the faculty's capability in research. The capability dimensions refer to skills that generate incremental knowledge, techniques, and perspective, which buoy up the faculty's innovation potential. To cultivate this potential, HEIs may pursue specific strategies for building research capacity and, eventually, their faculty capability in research. On a closer look, it shall consider the institutional role in formulating clear policies, contriving strategic plans, adopting approaches, setting up funding, and maintaining technology, facilities, and support services to develop a competent and productive research workforce in colleges and universities.

As a whole, the study findings present worrying signs that HEIs cannot simply stand quiet and remain complacent about their self-definition of quality and excellence. At the same time, they cannot remain stagnant, unresponsive, and defocused in the midst of the national call and competition taking place. Just like other academic institutions outside the province, HEIs in the province need to devotedly partake in the assembling of supportive school governance that cultivates and proliferates research production.

Society needs capable researchers producing scholarly outputs that would contribute to knowledge expansion, poverty alleviation, and sustainable development. The institutional research activity can open up a venue for tripartite or university-industry-government interaction to bolster more productive innovation dynamics. With these findings presented, the HEIs may look into their current status and capacity in research and subsequently strengthen efforts to establish a clear direction and performance expectation while aligning their actions and priorities to foster research development.

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The author confirms that the manuscript is an honest, accurate, and transparent account of the study, that no vital features of the study have been omitted, and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:

The author declares that she has no competing interests.

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