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Determinants of teachers' research productivity

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ABSTRACT

Despite increasing expectations for teacher research engagement, limited empirical models explain how institutional and individual factors jointly influence research productivity among senior high school (SHS) teachers. This study examines the relationships among institutional support, research self-efficacy, research motivation, collaborative culture, and research productivity using structural equation modeling (SEM). A quantitative, non-experimental, cross-sectional design was employed with survey data from 420 teachers in public and private SHSs. Results show that institutional support significantly predicts research self-efficacy, motivation, and collaborative culture, which in turn significantly influences research productivity, with partial mediation effects observed. The final model demonstrated good fit (Chi-square/degrees of freedom (χ^2/df)=2.28, comparative fit index (CFI)=0.95, Tucker–Lewis index (TLI)=0.94, root mean square error of approximation (RMSEA)=0.05, standardized root mean square residual (SRMR)=0.04). Findings highlight the critical role of supportive institutional environments in enhancing teachers' research productivity and offer implications for educational leadership and professional development.

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1. INTRODUCTION

Despite the increasing emphasis on evidence-based practice and teacher-led inquiry, a comprehensive and empirically validated explanation of the factors influencing research productivity, defined in this study as teachers' sustained participation and output in research-related activities, among senior high school (SHS) teachers remains insufficiently developed [1]–[3]. Existing literature consistently identifies institutional support, research self-efficacy, motivation, and collaborative culture as important determinants of teacher research engagement; however, these variables are often examined independently or through limited linear approaches [4]–[7]. Consequently, prior findings remain fragmented and provide only a partial understanding of how organizational, psychological, and social dimensions interact to shape teachers' research productivity. Many studies also emphasize direct relationships while overlooking the indirect pathways through which institutional conditions influence sustained research engagement and output [8]–[12]. This fragmentation suggests the need for an integrative, theoretically coherent framework that explains how contextual and individual factors jointly shape research productivity among SHS teachers.

Teacher research plays an important role in improving instructional quality, strengthening reflective practice, and supporting school development [1]–[3]. However, despite these benefits, empirical evidence

consistently shows teacher engagement and productivity in research activities remain generally limited due to workload demands, administrative responsibilities, limited mentoring, and inadequate access to research resources [4]–[7]. These constraints may weaken confidence, reduce motivation, and limit collaboration, ultimately constraining research productivity. Although institutional support is frequently identified as an important enabling factor, prior studies differ in their conclusions regarding whether its relationship with research productivity is direct or operates through psychological and social mechanisms [13]–[15]. This inconsistency highlights the need for a more integrated explanation of how these variables jointly influence research outcomes.

Another important limitation in the literature concerns the conceptual overlap among institutional support, collaborative culture, motivation, and research self-efficacy. These constructs are frequently discussed in close association but are not always clearly differentiated, leading to construct ambiguity. In this study, institutional support refers to formal organizational provisions and structural assistance provided by the institution, such as administrative encouragement, research training, funding opportunities, workload support, and access to resources. Collaborative culture refers to the informal and environment that promotes collegial interaction, knowledge exchange, mentoring, and collective participation in research activities. Research self-efficacy reflects teachers' beliefs in their capability to successfully perform research-related tasks, while research motivation refers to internal and external drivers that sustain engagement in research. Clearly distinguishing these constructs is necessary to reduce conceptual overlap and improve the precision of the explanatory model.

Theoretical foundations: limited integration of organizational, psychological, and social perspectives further constrains understanding of teacher research engagement and productivity of teacher research engagement. Prior studies commonly rely on single or loosely connected theoretical perspectives, resulting in fragmented interpretations of research behavior. To address this gap, the present study synthesizes social cognitive theory, self-determination theory, and organizational support theory into a unified explanatory framework [8]–[12]. Organizational support theory explains how institutional conditions create a supportive environment that signals value and commitment toward teacher research. These conditions shape teachers' perceptions of being valued and supported, thereby encouraging research engagement. Social cognitive theory complements this by explaining how institutional support is theorized to be positively associated with research self-efficacy through mastery experiences, social persuasion, and observational learning. Self-determination theory further explains how supportive environments may contribute to higher levels of research motivation by satisfying needs for competence, autonomy, and relatedness. Within this framework, collaborative culture is proposed to serve as a social pathway through which institutional support relates to research engagement and productivity into shared learning, collegial engagement, and sustained participation in research activities. Together, these theories provide a coherent explanation of how institutional, psychological, and social factors interact to shape research productivity.

Methodological limitations in prior studies also justify the need for the present investigation. Some research relies heavily on descriptive and self-reported measures, with limited use of advanced analytical techniques capable of examining multivariate and mediated relationships. In addition, several studies lack rigorous confirmatory factor analysis (CFA), raising concerns regarding construct validity and comparability across contexts [16]–[18]. Limited attention to model fit evaluation and alternative structural specifications further constrains the robustness of earlier findings. These limitations highlight the importance of structural equation modeling (SEM), which enables simultaneous analysis of measurement and structural models while accounting for measurement error and testing complex relationships among latent constructs. SEM also allows examination of direct and indirect effects within a single coherent model, making it suitable for the present study.

In response to these gaps, this study develops and empirically examines an integrative structural model of SHS teachers' research productivity. It investigates the relationships among institutional support, research self-efficacy, research motivation, collaborative culture, and research productivity using SEM. The study aims to: i) assess the levels of the key variables; ii) validate the measurement model; iii) examine structural relationships among constructs; and iv) test the mediating roles of research self-efficacy, motivation, and collaborative culture. Given the cross-sectional design, findings are interpreted as associations rather than causal effects, and no causal inferences are made.

This study contributes to education by integrating organizational, psychological, and social dimensions into a unified framework of teacher research productivity. It clarifies construct distinctions, applies SEM and measurement validation procedures to improve analytical rigor and construct assessment, and addresses the underrepresentation of SHS teachers in research. Practically, it offers insights for designing institutional support systems, collaborative structures, mentoring programs, and capacity-building initiatives aimed at enhancing teacher research engagement and productivity.

2. METHOD

2.1. Research design

This study employed a quantitative, non-experimental, cross-sectional survey design to examine the relationships among institutional support, research self-efficacy, research motivation, collaborative culture, and research productivity among SHS teachers. The design was considered appropriate because it enabled the examination of associations among the study variables within a naturally occurring educational context without manipulating conditions or establishing temporal sequencing. SEM was utilized as the primary analytical technique because it allows for the simultaneous evaluation of measurement and structural models while accounting for measurement error, thereby providing a systematic framework for examining complex multivariate relationships among latent constructs [19]. In this study, SEM was used to assess the extent to which the proposed theoretical model was consistent with the observed and to examine hypothesized direct and indirect associations among the study variables. However, given the cross-sectional nature of the research design, the findings are interpreted as relational rather than causal, and no causal conclusions are inferred from the observed relationships among the constructs.

2.2. Participants and sampling

A total of 420 SHS teachers from 28 public and private schools located in selected divisions in Region XI, Philippines, participated in the study. Stratified random sampling was employed to ensure proportional representation across school type and geographic distribution. The sampling frame was obtained through coordination with school administrators and division offices and included eligible SHS teachers from 18 public and 10 private schools situated in urban and semi-urban areas. Inclusion criteria required participants to be actively teaching in a SHS, possess at least one year of teaching experience, be employed in either a public or private institution, and voluntarily agree to participate in the study. Of the total sample, 294 teachers (66.7%) were drawn from public schools and 126 teachers (33.3%) from private schools, reflecting the proportional distribution of SHS teachers within the study area. Proportional allocation was determined by calculating the percentage contribution of each stratum to the total eligible teacher population and assigning sample sizes accordingly. Within each stratum, participants were randomly selected using a computer-generated randomization process to minimize selection bias.

Survey invitations and informed consent forms were distributed through designated school coordinators, and follow-up reminders were issued to improve participation rates and reduce non-response bias. Comparisons between early and late respondents revealed no statistically significant differences in the major study variables, suggesting minimal non-response bias. The use of stratified random sampling was intended to strengthen the representativeness of the sample and improve the contextual generalizability of the findings within Region XI. Furthermore, the final sample size exceeded recommended thresholds for SEM, satisfying both minimum absolute sample requirements (N≥200) and parameter-based guidelines for multivariate analysis [20]. Participants also represented varied demographic and professional characteristics, including differences in gender, teaching experience, and institutional context, thereby providing a diverse representation of SHS educators included in the study, as shown in Table 1.

Table 1. Demographic characteristics of respondents (*N*=420)

Variable	Category	*n*	%
School type	Public	294	66.7
	Private	126	33.3
Gender	Male	168	40.0
	Female	252	60.0
Teaching experience	≤5 years	102	24.3
	6–10 years	148	35.2
	>10 years	170	40.5

2.3. Instruments

Data were collected using five standardized self-report instruments, each using a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Institutional support was measured using an eight-item scale adapted from Eisenberger *et al.* [21], research self-efficacy using a seven-item scale from Khan *et al.* [22], research motivation using a six-item scale based on Ryan and Deci [23], collaborative culture using a six-item scale derived from Hargreaves and Dawe [24], and research productivity using a five-item scale from Aivaz *et al.* [25]. These instruments were selected due to their established psychometric properties and prior application in educational research and were further reviewed by a panel of experts to establish content validity and ensure contextual relevance to the SHS setting. Instrument adaptation involved careful contextual alignment, including minor linguistic modifications and terminology adjustments to reflect local SHS conditions, as well as pilot testing to ensure clarity and interpretability of items. Although conceptual

equivalence with the original scales was maintained, no full-scale retranslation was conducted, as only contextual refinements were necessary. All data were obtained through self-report, which may introduce common method bias and social desirability effects; however, measures such as ensuring anonymity, voluntary participation, and emphasizing honest responses were implemented to mitigate these risks. The final adapted instruments are presented in Table 2.

Table 2. Summary of instruments

Construct	Source	No. of items	Sample item
Institutional support	Eisenberger *et al.* [21]	8	"My school encourages teachers to conduct research."
Research self-efficacy	Khan *et al.* [22]	7	"I am confident in writing a research report."
Research motivation	Ryan and Deci [23]	6	"I am motivated to conduct research for professional growth."
Collaborative culture	Hargreaves and Dawe [24]	6	"Teachers in my school collaborate on research."
Research productivity	Aivaz *et al.* [25]	5	"I have completed research studies in the past two years."

2.4. Data collection

Ethical approval was secured from the appropriate institutional review board prior to data collection. Data were collected through an online survey platform to ensure accessibility and efficiency. Participation was voluntary, and informed consent was obtained from all respondents. The survey instruments were adapted from established and validated scales in prior studies, selected based on their alignment with the study constructs and theoretical framework. Content validity was evaluated through expert review of item relevance and construct alignment. Internal consistency reliability was assessed using Cronbach's alpha and composite reliability (CR) coefficients, with all constructs meeting recommended acceptability thresholds. Construct validity was further examined through CFA using acceptable factor loadings and model fit indices. To protect participants' privacy and encourage honest responses, confidentiality and anonymity were strictly maintained through secure data handling and de-identification procedures [26], [27].

2.5. Data analysis

Data screening included checks for missing values, outliers, and normality to meet SEM assumptions. Internal consistency was assessed using Cronbach's alpha and CR. The adapted instruments were validated through expert review and pilot testing to ensure content validity and contextual clarity. CFA established convergent and discriminant validity, followed by SEM with maximum likelihood estimation to test the hypothesized model. Model fit was evaluated using Chi-square/degrees of freedom (χ^2/df), comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) based on recommended criteria, while mediation effects were examined using bootstrapping procedures.

To address potential common method variance (CMV) due to single-source, self-report data, both procedural and statistical remedies were applied. Anonymity and confidentiality were ensured, and questionnaire design minimized response bias. Harman's single-factor test indicated that no single factor accounted for the majority of variance, suggesting that CMV was not a serious concern. Overall, these procedures support the rigor and validity of the study's findings [28]–[30].

3. RESULTS

3.1. Descriptive statistics

Descriptive statistics for all study variables are presented in Table 3. Overall, participants reported moderate to high levels of institutional support (M=3.42, SD=0.67), research self-efficacy (M=3.58, SD=0.61), research motivation (M=3.71, SD=0.59), and collaborative culture (M=3.49, SD=0.65). Research productivity was slightly lower (M=3.12, SD=0.72) compared to other constructs. Internal consistency for all scales was satisfactory, with Cronbach's alpha coefficients ranging from 0.85 to 0.89, indicating good reliability, as shown in Table 3.

Table 3. Descriptive statistics of study variables

Construct	Mean	SD	Cronbach's α
Institutional support	3.42	0.67	0.89
Research self-efficacy	3.58	0.61	0.88
Research motivation	3.71	0.59	0.86
Collaborative culture	3.49	0.65	0.87
Research productivity	3.12	0.72	0.85

Note: SD=standard deviation; α=Cronbach's alpha. All variables were measured on a 5-point Likert scale, with higher scores indicating greater levels of the construct.

3.2. Measurement model

CFA supported the adequacy of the measurement model. Fit indices indicated good model fit: χ^2/df=2.31, CFI=0.95, TLI=0.94, RMSEA=0.05, and SRMR=0.04. Standardized factor loadings for all items ranged from 0.65 to 0.84, demonstrating satisfactory indicator reliability. CR values ranged from 0.87 to 0.91, and average variance extracted (AVE) values ranged from 0.52 to 0.56, confirming convergent validity across constructs. Discriminant validity was also supported, as the square roots of AVE for each construct exceeded inter-construct correlations, as shown in Table 4.

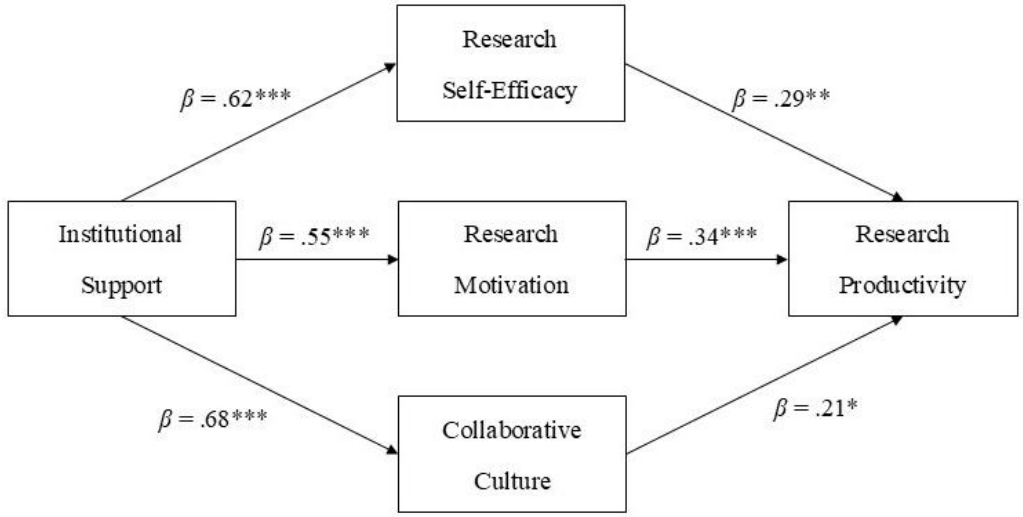
Table 4. Standardized factor loadings and validity indices

Construct	Loading range	CR	AVE
Institutional support	0.68–0.84	0.91	0.56
Research self-efficacy	0.65–0.82	0.89	0.54
Research motivation	0.66–0.80	0.88	0.52
Collaborative culture	0.67–0.83	0.90	0.55
Research productivity	0.69–0.81	0.87	0.53

Note: all factor loadings are standardized and significant at p<0.001.

3.3. Structural model

The hypothesized structural model was tested using SEM. The final model demonstrated excellent fit: χ^2/df=2.28, CFI=0.95, TLI=0.94, RMSEA=0.05, and SRMR=0.04. Standardized path coefficients indicated that institutional support positively and significantly predicted research self-efficacy (β=0.62, p<0.001), research motivation (β=0.55, p<0.001), and collaborative culture (β=0.68, p<0.001). In turn, research self-efficacy (β=0.29, p<0.01), research motivation (β=0.34, p<0.001), and collaborative culture (β=0.21, p<0.05) were significant positive predictors of research productivity, as shown in Figure 1.



Note: *p<0.05, **p<0.01, ***p<0.001. All path coefficients are standardized. Model fit indices: χ^2/df=2.28, CFI=0.95, TLI=0.94, RMSEA=0.05, SRMR=0.04

Figure 1. Final structural equation model with standardized path coefficients

3.4. Mediation analysis

Mediation effects were examined using bootstrapping with 5,000 resamples. As shown in Table 5, institutional support demonstrated a significant direct association with research productivity (β=0.18, p<0.05) and a significant indirect association through research self-efficacy, research motivation, and collaborative culture (β=0.32, p<0.01), resulting in a significant total effect (β=0.50, p<0.001). These findings indicate partial mediation within the proposed structural model, suggesting that institutional support is positively associated with research productivity both directly and indirectly through the specified mediators, with the direction of relationships being theory-driven rather than indicative of causal effects.

Table 5. Direct, indirect, and total effects

Path	Direct effect	Indirect effect	Total effect
Institutional support → research productivity	0.18*	0.32**	0.50***

Note: Bootstrapped estimates based on 5,000 resamples. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

4. DISCUSSION

The present study found that institutional support significantly predicts research self-efficacy, research motivation, and collaborative culture among SHS teachers, and that these three variables significantly predict research productivity. The results further indicate that research self-efficacy, motivation, and collaborative culture partially mediate the relationship between institutional support and research productivity. Overall, the findings support the proposed model, suggesting that institutional conditions are associated with teacher research productivity through both direct pathways and interconnected psychological and social mechanisms, although the strength of these pathways varies across constructs.

When compared with existing literature, the results are broadly consistent with studies emphasizing institutional support as a key driver of teacher research engagement [1], [2], as well as those identifying self-efficacy and motivation as critical psychological predictors of research involvement [3], [5]. The observed role of collaborative culture also aligns with prior findings highlighting collegial environments as facilitators of research participation [4]. However, this study extends prior work by simultaneously modeling these variables within a single structural framework rather than examining them in isolation. At the same time, the relatively weaker indirect effects observed in some pathways suggest that the influence of institutional support may be more context-dependent than previously assumed, particularly in SHS settings where structural constraints remain prominent.

In interpreting these findings, institutional support appears to function as a foundational enabling condition that shapes both individual beliefs and social environments. Its strongest influence is observed in its relationship with research self-efficacy, suggesting that access to training, resources, and administrative encouragement may primarily operate by strengthening teachers' perceived competence in conducting research. In contrast, the indirect pathway through collaborative culture, while significant, is comparatively less dominant, indicating that structural support does not automatically translate into sustained collegial research practices without deliberate organizational efforts to foster collaboration. Similarly, the mediation effect of motivation, although present, suggests that motivation alone may not fully explain how institutional support translates into productivity, pointing to the persistence of structural constraints such as workload and time limitations.

From a theoretical standpoint, the findings provide partial but not fully integrated support for the combined use of social cognitive theory, self-determination theory, and organizational support theory. Rather than functioning as a fully unified explanatory system, the results suggest that each theory explains different segments of the model: organizational support theory best explains the direct influence of institutional conditions, social cognitive theory most strongly accounts for the development of self-efficacy, and self-determination theory primarily explains motivational processes. This indicates that while theoretical integration is useful, it remains largely additive rather than fully synthesized into a single mechanism, as the pathways operate in parallel rather than through a deeply interdependent structure. This limitation should be considered when interpreting claims of theoretical advancement.

The practical implications of these findings are significant for school leadership and policy development. Strengthening institutional support remains essential, particularly through tangible mechanisms such as research funding, workload adjustments, and access to training opportunities. However, the results also suggest that such structural interventions should be complemented by targeted efforts to enhance research self-efficacy and motivation, as well as intentional strategies to build collaborative research cultures within schools. Without these complementary mechanisms, institutional support alone may not fully translate into sustained improvements in research productivity. This emphasizes the need for multi-level interventions that address both structural and psychological dimensions of teacher research engagement.

Several limitations should be acknowledged. The cross-sectional design limits the ability to infer temporal or causal relationships among variables, and the observed associations should be interpreted as theoretically consistent rather than causal. In addition, the reliance on self-reported measures may introduce response bias, particularly in constructs such as research productivity and motivation. While statistical procedures were applied to ensure measurement validity, shared method variance cannot be fully eliminated. Furthermore, the focus on SHS teachers within a specific context limits the generalizability of the findings to other educational levels or settings. These limitations were partially mitigated through rigorous sampling and SEM procedures, but they still constrain the interpretive scope of the results.

Future research should consider longitudinal or mixed method designs to better capture the dynamic nature of research engagement over time. Expanding the model to include additional mediators such as leadership style, institutional climate, or workload pressure may also provide a more nuanced understanding of teacher research productivity. Comparative studies across different educational levels and regions would further strengthen the external validity of the model. In conclusion, while the present study supports an integrative explanation of teacher research productivity, it also highlights the need for more refined theoretical integration and context-sensitive empirical testing in future research.

5. CONCLUSION

The study provides empirical evidence that institutional support significantly enhances SHS teachers' research productivity both directly and indirectly through research self-efficacy, research motivation, and collaborative culture. Teachers' confidence, motivation, and collaborative work environments were shown to be critical mechanisms that translate institutional resources and encouragement into tangible research outputs. These findings highlight the importance of considering both organizational and individual-level factors when seeking to foster sustained research engagement among educators.

Based on these results, it is recommended that educational institutions implement comprehensive support systems that combine administrative encouragement, access to training and resources, and formal recognition of research contributions. Schools should also cultivate a collaborative culture that promotes peer mentoring, shared inquiry, and professional dialogue, while offering professional development programs aimed at enhancing teachers' research skills and self-efficacy. Future interventions should adopt a holistic approach that simultaneously addresses institutional, psychological, and social factors to maximize teachers' research productivity and ultimately improve instructional quality and school performance.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY

Data availability does not apply to this paper as no new data were created/analyzed in this study.

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