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CULTIVATING POSTGRADUATE STUDENTS RESEARCH PRODUCTIVITY: EXPLORING INTERPLAY BETWEEN RESEARCH SELF-EFFICACY AND SUPERVISORY SUPPORT

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ABSTRACT

Research productivity by postgraduate students not only furthers their academic and professional growth but substantially influences the broader scholarly community and the societal context as well. This research focused on the influence of research self-efficacy toward research productivity and perceived moderating effect of supervisory support. The interaction between these two critical factors is essential to enhance research productivity among postgraduate students in Indonesian higher education. Quantitative methodology is employed in this research study. The purposive sampling technique was used which included postgraduate students who engaged in research activities as its criteria. The sample size calculations used Slovin formulation and as many as 514 respondents were obtained comprising of 330 Master's students and 184 PhD students in Indonesia,. SmartPLS-4 was utilised to conduct structural equation model partial least square for data analysis. The results indicated that self-efficacy positively impacts research productivity. Furthermore, perceived supervisory support enhanced the interaction between research self-efficacy and research productivity. This investigation enriches theoretical landscape by applying Bandura's social cognitive theory to postgraduate research. Practically, based on these findings, it suggests that academic institutions can design research training programs to increase students' research self-efficacy levels, and develop strategies to facilitate supportive supervisory relationships which increases research productivity. Future research should employ longitudinal designs to clarify the causal relationships between research self-efficacy and research productivity, as well as replicate the research in various cultural and academic environments to improve its generalizability. Additionally, it should aim to incorporate objective productivity metrics and investigate other potential moderators and mediators to intensify the understanding of the factors and mechanisms driving research productivity.

Keywords: **Postgraduate Students, Research Productivity, Perceived Supervisory Support, Research Self-Efficacy, Quality Education**

INTRODUCTION

Postgraduate students play an urgent role in the progression of knowledge within their respective fields. As emerging researchers, postgraduate students are at the forefront of generating new insights and contributing to the academic and practical understanding of various disciplines (Lee & Kamler, 2008; Mendoza, 2007). Their involvement in research activities not only enhances their own academic and professional development but also significantly impacts the academic community and society at large (Cattaneo et al., 2019; Reymert & Thune, 2023).

The productivity of research within higher education institutions is a crucial element in shaping their reputation and prestige (Sukoco et al., 2023; Mudzakkir et al., 2022; Sukoco et al., 2021). This aspect significantly impacts the rankings of universities globally with leading rankers such as Times Higher Education and QS World University Ranking placing a significant emphasis of 60% on the quality of research in their evaluation criteria (Barrot, 2017). This highlights the vital role that postgraduate students play in enhancing the research output and international standing of their institutions.

Moreover, research is essential for the development and economic prosperity of a nation. It forms the basis for a country's progress in innovation and technology (Giachetti & Mensah, 2023) which in turn fosters economic growth and enhances the well-being of its citizens. Through the progression of new knowledge and the acquisition of patents, postgraduate students can make a significant contribution to their country's competitive advantage in the global market and technology transfer (Cheng et al., 2023; Kirs et al., 2021; Menter, 2023).

The current research issue in Indonesia, as emphasized by recent studies, is on the intricate difficulties encountered by the academic community in improving the quality and global recognition of their research publications. Bhatt and Samanhudi (2022) provide insight into the literacy habits of Indonesian academics, highlighting the challenges they face in conforming to the growing influence of English language journal requirements. This congruence is crucial due to the global academic standards that promote English papers with a significant influence. The study reveals a notable deficiency in the current academic support systems, which fail to appropriately equip Indonesian scholars for global standards. As a result, there are discrepancies in the ability of Indonesian academics to effectively compete on the international arena.

Moreover, Sukoco et al. (2023) point out that while Indonesia has shown a remarkable surge in publication volume, this has not been matched by a corresponding increase in citation impact, indicating a quality gap. The data suggest that despite being prolific in terms of quantity, Indonesian research lacks the depth or innovation required to draw international scholarly attention. This misalignment between quantity and quality of research highlights systemic issues within the Indonesian higher education system, including the need for more rigorous research training and mentorship. Tantengco (2021) further complicates the issue by analyzing how different regions have responded to COVID-19 study. Indonesia, although severely affected, falls behind its neighbouring countries such as Malaysia, Singapore, and Thailand in terms of scientific contributions regarding COVID-19. The underperformance can be ascribed to various variables, such as a decrease in GDP, reduced spending on research and development, and a decrease in foreign collaborations, all of which have a positive correlation with research productivity. This circumstance highlights the immediate necessity for specific legislative measures designed to improve research financing and worldwide collaboration prospects for researchers from Indonesia.

Unfortunately, postgraduate students encounter a myriad of challenges and pressures that can impact their research productivity (RP). Balancing multiple responsibilities, such as research, coursework, and teaching duties, often leads to time constraints and competing priorities, making it difficult to focus on research activities (Gardner, 2009; Alisic et al., 2024; Winarno & Hermana, 2019). Securing adequate funding is another significant hurdle, as limited financial resources can restrict access to necessary equipment, materials, and conferences, thereby hindering research progress (Chang et al., 2022; Turner, 2023). The attribute of the supervisory bond is crucial for research success, and

a lack of support, guidance, or feedback can lead to feelings of isolation and uncertainty (Lee, 2008; Anttila et al., 2024). Additionally, the pressure to publish and succeed academically can be overwhelming, leading to stress, anxiety, and other mental health issues that negatively affect RP (Levecque et al., 2017; Cornér et al., 2024). Developing the necessary research skills and competencies is also a significant challenge, as inadequate training in research methodologies, data analysis, and academic writing can hinder the ability to conduct high-quality research (Mertkan et al., 2022; Hammack et al., 2023; Pyhältö, 2023). Lastly, navigating the academic publishing process can be daunting, with challenges such as understanding the publication process, dealing with rejection, and responding to reviewer feedback (Bitchener et al., 2010; Carless et al., 2024).

Amidst these challenges, enhancing postgraduate students Research Self-Efficacy (RSE) is critical for fostering their RP (Randazzo et al., 2021). RSE, defined as the person belief in their ability to complete scientific research tasks, which reflects confidences in academic research, it can help scholar to believe that they can put forward practical research problems, find methods for research problems, successfully solve problems, and produce scientific payoffs when facing practical problems (Han et al., 2023). Previous research has shown that students with high RSE are more likely to engage persistently in research activities, employ effective problem-solving strategies, and overcome obstacles in the research process (Kim & Kutscher, 2021).

Conversely, low RSE can have detrimental effects on RP. Students with low RSE may doubt their capabilities to conduct research, leading to procrastination, avoidance of challenging research tasks, and a tendency to give up easily when faced with difficulties (Ma et al., 2023; Sasson & Miedijensky, 2023). This lack of confidence can result in decreased motivation and engagement in research activities, ultimately impacting the quality and quantity of their research output (Ndiango et al., 2024; Haider & Dasti, 2022). Moreover, low RSE can contribute to increased stress and anxiety, further exacerbating the challenges associated with RP (Naveed et al., 2020; Nori & Vanttaja, 2023).

In light of the negative impact of low RSE on RP, the role of supervisory support becomes crucial in fostering an environment conducive to enhancing RSE (Muneeb et al., 2020). Supervisory support, characterized by guidance, feedback, and mentorship from academic supervisors, can significantly bolster students' confidence in their research abilities (Lee, 2008; Xu & Liu, 2023). By providing constructive feedback, offering emotional support, and encouraging independence in research, supervisors can assist scholar develop a stronger sense of efficacy in their research skills (Bearman et al., 2024; Liu & Gumah, 2020). This supportive relationship can mitigate feelings of isolation, reduce stress and anxiety, and promote a more positive outlook towards research challenges (Chan, 2017; Zhang et al., 2022). Furthermore, regular interactions with supervisors can provide opportunities for skill development and problem-solving, which are essential for enhancing RSE and, consequently, RP (Jeong et al., 2020; Patsali et al., 2024).

Given the potential consequences of low RSE on RP and the possible moderating role of supervisory support in this correlation, this study aims to investigate two key objectives among postgraduate students. Firstly, it seeks to examine the direct influence of RSE on RP, assessing how students' confidence in their research abilities impacts their research output. Secondly, the study aims to examine the moderating effect of perceived supervisory support (PSS) on the association between RSE and RP. This involves assessing whether the quality of guidance, feedback, and mentorship provided by academic supervisors can strengthen or weaken the relationship between students' research self-efficacy and their research productivity.

This study investigates a population comprising 410,316 Master's (S2) and Doctoral (S3) students in Indonesia. Employing purposive sampling, the study targets postgraduate students actively engaged in research activities, resulting in a sample size of 514 respondents. This sample includes 330 Master's students and 184 PhD students, drawn from four higher education in East Java. The selection process utilized both online and offline survey methods to ensure a diverse and representative sample. Structural Equation Modelling (SEM) is employed as the primary analytical approach, utilizing the SmartPLS-4 software for data analysis.

This study enriches the theoretical landscape by applying Bandura's social cognitive theory to postgraduate research within Indonesian universities, showcasing how RSE is a crucial determinant of RP and how PSS significantly moderates this relationship (Wood & Bandura, 1989). It amplifies the understanding of RSE by factoring in the educational dynamics of a developing nation and illustrates how supervisory support enhances academic output (Sulistyani & Suhariadi, 2022). Practically, the research underscores the need for mentorship and feedback mechanisms to build research confidence and productivity among postgraduate students. By suggesting the establishment of peer networks and structured mentoring, alongside enhancing self-efficacy through targeted training and self-reflective practices, the findings inform educational policies, supervisor development programs, and strategic academic initiatives aimed at bolstering the research capacity of postgraduate students in the context of the challenges unique to Indonesian higher education.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Social Cognitive Theory (SCT)

Albert Bandura's Social Cognitive Theory (SCT) offers a comprehensive framework to examine the dynamics between individual beliefs, behaviors, and environmental interactions, particularly useful in analyzing the effects of Research Self-Efficacy (RSE) on Research Productivity (RP) among postgraduate students. Central to SCT is the notion of self-efficacy, defined as an individual's belief in their ability to execute behaviors necessary to achieve specific outcomes (Bandura, 2001). This concept is pivotal in this study as it underpins postgraduate students' confidence in their research capabilities, which significantly influences their engagement and productivity in research activities (Gong et al., 2022; Hemmings & Kay, 2016). SCT also posits that behavior is influenced by a model of reciprocal determinism, where personal factors, behaviors, and environmental influences are interdependent (Bandura, 1999). In the academic context, this suggests that environmental factors like supervisory support not only enhance RSE but also contribute to higher RP (Kozhakhmet et al., 2022; Roberts et al. 2019). Empirical evidence underscores the relevance of SCT in educational settings, showing that self-efficacy is a strong predictor of academic performance and persistence in challenging tasks, critical for research productivity (Beiler, 2014; Küçükaydın, 2024; Li & Khattak, 2023; Ruiz et al., 2024; Joynt, 2023). Moreover, the role of environmental factors, such as the quality of supervisory support, is crucial as it significantly shapes students' self-efficacy and their research outcomes (Pownall et al., 2023; Han et al., 2022; Livinţi et al, 2021; Okolie et al., 2021).

In essence, SCT not only elucidates the direct impact of RSE on RP but also emphasizes the importance of supervisory support in enhancing this relationship. This theoretical foundation is instrumental in developing a research model that explores how personal beliefs, supported by environmental facilitators, drive behaviors leading to academic productivity. Thus, SCT provides a structured approach to understanding and investigating the complex interplays influencing research productivity among postgraduate students.

Research Self-Efficacy toward Research Productivity

Some researchers advocate for further exploration into how RSE influences research outcomes, such as productivity, particularly within the context of higher education (Li & Zhang, 2022; Zhang, 2022; Zarei & Mohammadi, 2022). Additionally, there is a lack of empirical data regarding this relationship in developing nations (Uwizeye et al., 2021). Therefore, investigating the impact of RSE on RPR among postgraduate students in developing nations like Indonesia is a valuable avenue to bridge this gap. The relationship between RSE and RP has been assessed through self-reported metrics such as the number of publications, presentations, and grants (Ndiango & Jaffu, 2024). These indicators of RP have shown a correlation with RSE in academic settings (Jang and Shin, 2011), possibly due to the impact of hands-on experiences (Pajares, 2002; Azila et al., 2022). For instance, students with higher research productivity are likely to have more success in publishing, leading to further opportunities for research and skill development through collaborations and grants, which may enhance RSE. Conversely, students with limited publishing success might experience lower levels of RSE (Ismayilova & Klassen, 2019).

Self-efficacy is generally regarded as a motivational factor that influences individuals' engagement in specific behaviours, their level of effort, and their persistence (Gaoat, 2022). It has been identified as a reliable predictor of performance across various work-related contexts (Hayat et al., 2020). In the realm of higher education, RSE is likely to predict postgraduate students' engagement in research activities (Livinți et al., 2021). This is because it fosters commitment, effort, and persistence (Supervía et al., 2022; Litson et al., 2021). Postgraduate students who possess high self-efficacy tend to have greater confidence in their abilities and are inclined to perceive difficult research tasks as opportunities instead of barriers (Matos et al., 2021). Moreover, postgraduate students with strong confidence in their research abilities are able to efficiently allocate resources like time, thereby boosting their involvement in research activities and enhancing their research output (Abun, 2021). Therefore, given the significant role of RSE in predicting outcomes related to research in higher education and the limited availability of empirical evidence regarding its influence on RPR among postgraduate students in developing countries, this research aims to investigate the effect of RSE on RPR in Indonesian higher education institutions. Consequently, it is hypothesized that:

H1: Postgraduate students research self-efficacy has a positive influence on postgraduate students' research productivity.

Moderating Role of Perceived Supervisory Support

Supervisory support, encompassing the guidance and assistance provided by supervisors to postgraduate students, is a critical aspect of their research training (Holloway & Walker, 2000; Ahmed et al., 2017). Supervisors take part an important role in mentoring postgraduate students by offering both direct and indirect support in selecting research topics, navigating the research process, and crafting scholarly papers. This mentorship is particularly crucial in systems characterized by "single supervisor supervision," such as in China, where supervisors bear the primary responsibility for their students' research training (Bøgelund, 2015). A plethora of studies has demonstrated the positive correlation between supervisory support and various outcomes for postgraduate students, including research commitment, satisfaction, innovation, productivity, engagement, and performance (Liu et al., 2019; Dericks et al., 2019).

Given the diverse challenges postgraduate students face during their research journey, the need for varied types of support from supervisors is paramount (Oswalt & Riddock, 2007; Olswang & Prelock, 2015). Effective supervision encompasses both academic and personal support, with the former focusing on direct assistance in research-related activities and the latter emphasizing the supervisors' role in helping students overcome research obstacles and ensuring their psychological well-being (Ballard & Clanchy, 1993; Green & Bauer, 1995). Furthermore, supervisory support is a key contextual factor influencing individuals' self-efficacy across various settings (Tierney & Farmer, 2002; Heflinger & Doykos, 2016). Within higher education, supervisors boost postgraduate students' self-efficacy by providing support that is connected to mastery and vicarious experiences (Van Dinther et al., 2011). The quality of the relationship between supervisors and postgraduate students is crucial for the students' success, impacting their educational objectives, ability to publish in reputable journals, and employability (Maxwell & Smyth, 2011; Hou et al., 2021). The support and guidance provided by supervisors, referred to as Perceived Supervisory Support (PSS), are instrumental in developing postgraduate students' research productivity and overall success in their academic endeavours. Hence, it is hypothesized that:

H2: Perceived Supervisory Support enhance Research self-efficacy towards Postgraduate Students Research Productivity

Drawing from an extensive examination of the literature and the formulation of the suggested hypotheses, a research model has been established as depicted in Figure 1. This illustration aids in understanding the potential causal links and interaction effects between RS, PSS, and RP that are anticipated based on the hypothesis development and will guide subsequent data analysis and interpretation study finding.

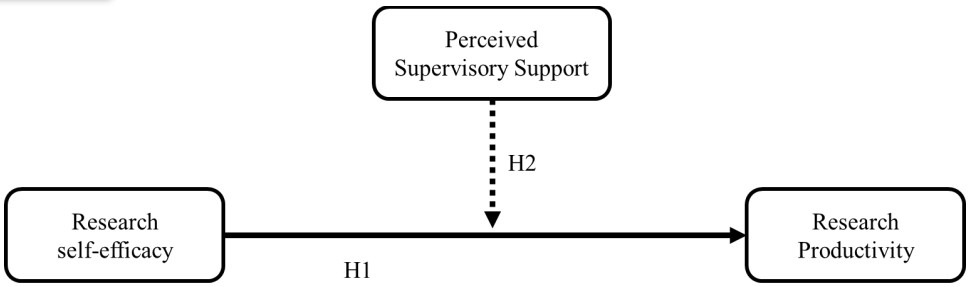

Figure 1. Research Hypothesis Framework Model

METHODOLOGY

The research design utilized in this study is a quantitative approach to particularly investigate the interrelationships between Research Self-Efficacy (RSE), Perceived Supervisory Support (PSS), and Research Productivity (RP) among postgraduate students in Indonesia. This design utilizes primary data obtained through a meticulously structured survey methodology, allowing for a thorough investigation of the presented hypotheses and making a substantial contribution to the existing body of knowledge in educational research.

Population and Sample

The participants in this study consist of postgraduate students, specifically Master's (S2) (353,670) and Doctoral (S3) (56,646) students across Indonesia, with a total of 410,316 individuals based on data from the Indonesian Directorate General of Higher Education, Research, And Technology (2023). The sample technique used is purposive sampling, which is selected for its capacity to choose specific individuals who satisfy the criteria. The criteria are as follows: (1) Postgraduate students who have completed more than 2 semesters and have begun doing research, and (2) Postgraduate students who have actively participated in research activities. (Campbell et al., 2020). We used purposive sampling in our study to carefully select participants who are actively involved in research activities, ensuring that they have the necessary experience and expertise. This approach also allowed us to efficiently collect data from a diverse population of postgraduate students in Indonesia, which enhances the reliability and relevance of our research findings. To determine minimum sample size, Slovin formula was used, resulting in a requirement of 399 respondents (Slovin, 1960).

The actual sample size obtained during collecting data was 514 respondents, with 330 Master's students and 184 PhD students, collected from four universities in East Java using both online (Google Form) and offline survey methods. This mixed-mode approach of data collection is supported by Mackeben & Sakshaug (2023), who emphasize its effectiveness in enhancing response rates and ensuring diverse respondent representation. The study's adherence to rigorous sampling techniques and the achievement of a sample size exceeding the minimum requirement contribute to the reliability and validity of the research findings (Chetverikov & Upravitelev, 2016).

Measurement

In this study, the measurement of variables is grounded in scales from prior research, which were adapted to suit the study's context. Research Self-Efficacy is measured using an 8-item scale from Mensah et al. (2023), assessing postgraduate students' confidence in their research abilities. Perceived Supervisory Support is evaluated through 4-item scale (Fan et al., 2019), examining students' perceived support from their supervisors. Research Productivity is gauged using 6-item scale (Fauzi et al., 2024), assessing students' research outputs and accomplishments. All variables are assessed using a five-point Likert scale, with options from 1 (strongly disagree) to 5 (strongly agree), enabling detailed responses. The reliability and validity of these scales are verified through statistical analysis, with results including Outer Loading (OL), Average Variance Extracted (AVE), Fornell-Larcker criterion (FL), Cronbach's Alpha (CA), and Composite Reliability (CR) presented in Table 2, ensuring the scales' internal consistency, convergent validity, and discriminant validity.

Data Analysis

The data analysis consists of two primary components: the analysis of the measurement model and the analysis of the structural model. Structural Equation Modeling (SEM) is used as the main method of analysis, with the SmartPLS-4 software being utilized for data processing and analysis (Ringle et al., 2015).

Measurement model analysis is focused on evaluating the discriminant and convergent validity of the variables. This is achieved through use of OL, AVE, and FL. In addition, reliability testing is conducted using CA and CR to ensure the internal consistency of the variable (Hanafiah, 2020).

In subpart structural model analysis, influence of one latent variable on other latent variables were evaluated. This evaluation is carried out by examining the percentage of variance explained and looking at the Path Coefficients (β) and R^2 values. The R^2 value helps identify the proportion of variance in the dependent variable that can be predicted from the independent variables and provide insight into the model's explanatory power (Risher, & Hair (2017).

Through these analytical techniques, the study aims to establish measurement model validity and reliability to test the hypothesized relationships within the structural model, thereby providing a comprehensive understanding of the underlying constructs and their interrelationships.

RESULTS

Respondent Characteristic

The Table 1 data reveals an extensive overview of the respondents' demographic involved in this study. Among the 514 respondents, there is a higher proportion of female student, accounting for 57.39%, compared to 42.61% of male student. In terms of doctoral programs (184 individuals, 35.80%) 24.71% of respondents are enrolled in human resource development doctoral program, followed by 11.09% in law & development doctoral program.

The master's programs student (330 individuals, 64.20%) exhibits a broader range of disciplines, with 20.23% of respondents pursuing human resource development master program, and smaller percentages engaged in education master program (5.06%), law science master program (4.09%), law & development master program (4.86%), disaster management master program (3.70%), immunology master program (5.06%), police science studies master program (8.95%), forensic science master program (3.50%), health economics master program (2.53%), and public administration master program (6.23%). The majority of the respondents are part-time students, also known as practitioners (351 student), making up 68.29%, while full-time students (163 student) represent 31.71% of the population. When it comes to research funding, a significant majority of 92.80% of respondents are self-funded, with only 37 students (7.20%) receiving funded research opportunities.

Table 1. Demographic of Respondent

Characteristic	Category	N	%
Gender	Male	219	42.61%
	Female	295	57.39%
Doctoral Program	Human Resource Development	127	24.71%
	Law & Development	57	11.09%
N Doctoral Program		***184***	***35.80%***
Master Program	Human Resource Development	104	20.23%
	Education	26	5.06%
	Law Science	21	4.09%
	Law & Development	25	4.86%
	Disaster Management	19	3.70%
	Immunology	26	5.06%

	Police Science Studies	46	8.95%
	Forensic Science	18	3.50%
	Health Economics	13	2.53%
	Public Administration	32	6.23%
N Master Program		***330***	***64.20%***
Student Status	Full-Time Student	163	31.71%
	Part-Time Student (Practitioner)	351	68.29%
Research Fund	Funded	37	7.20%
	Self-Funded	477	92.80%
N Total Respondent		**514**	**100.00%**

Measurement Model

The measurement model in this research is rigorously evaluated using various statistical measures to ensure the constructs' validity and reliability. OL are used to evaluate the relationship strength between each item and its respective construct, with values above 0.70 considered acceptable, indicating a strong relationship (Hair et al., 2010; Mohamad et al, 2019). The AVE measures the average variance captured by the construct's items relative to the total variance, with a value above 0.50 deemed desirable (Fornell & Larcker, 1981). Both CR and CA are employed to evaluate the internal consistency reliability of the constructs, with values above 0.70 indicating good reliability (Ebersole et al., 2020). The FL is utilized to assess discriminant validity, ensuring that the square root of AVE for each variable is greater than its correlation with other variables (Iqbal et al., 2021).

Table 2. Measurement model test result

	Indicator Item Description	OL	AVE	FL	CA	CR
Research self-efficacy (RSE) *(Mensah et al., 2023)*			***0.695***	***0.833***	***0.937***	***0.951***
RSE1	I can acquire knowledge in research methodology and data analysis.	0.828				
RSE2	I have an interest in attending courses related to research.	0.833				
RSE3	I possess the ability to grasp the concepts of research methodology and data analysis.	0.834				
RSE4	I am proficient in comprehending statistical formulas.	0.822				
RSE5	I am capable of teaching and guiding other students in research-related topics.	0.762				
RSE6	I am competent in conducting research methods and data analysis, even when faced with challenging tasks.	0.816				
RSE7	I can resolve complex aspects of research.	0.888				
RSE8	I can collect research-related information from various sources.	0.877				
Perceived Supervisory Support (PSS) (*Fan et al., 2019)*			***0.650***	***0.806***	***0.884***	***0.838***
PSS1	My supervisor motivates us to have high expectations for ourselves.	0.839				
PSS2	My supervisor urges us to establish goals for our team's performance.	0.829				
PSS3	My supervisor advises us to commend one another for a job well done.	0.761				

	Indicator Item Description	OL	AVE	FL	CA	CR
PSS4	My supervisor prompts us to stay conscious of our performance level.	0.793				
Research Productivity (RP) *(Fauzi ,2023)*			***0.631***	***0.794***	***0.937***	***0.899***
RP1	I find fulfillment in my role as a researcher in my area of expertise.	0.823				
RP2	I proactively pursue research funding opportunities.	0.818				
RP3	I possess ample time to carry out research activities.	0.771				
RP4	I designate time specifically for publishing research findings.	0.788				
RP5	I consistently participate in professional conferences.	0.778				
RP6	I am involved in professional organizations that can positively impact my research field.	0.785				

The validity and reliability test results for the RSE consists of eight items (RSE1-RSE8), with OL ranging from 0.762 to 0.888. The OL for RSE is 0.695, AVE is 0.695, FL is 0.833, CA is 0.937, and CR is 0.951. The PSS scale the PSS scale with OL between 0.761 and 0.839. The AVE for PSS is 0.650, FL is 0.806, CA is 0.884, and CR is 0.838. Lastly, for the RP scale includes six items (RP1-RP6), with OL ranging from 0.771 to 0.823. The AVE for RP is 0.631, FL is 0.794, CA is 0.937, and CR is 0.899. These results suggest a high level of validity and reliability for three variables.

Creswell (2002) posited that the validity of research findings hinges on whether the data gathered aligns with the actual occurrences in the entity being studied. Neuman (2014) contends that the consistency of an instrument's outcomes across repeated measures is indicative of its reliability. The reliability was evaluated by measuring the uniformity with which the instrument gauged the variables across the same conditions and participants (Sarstedt & Hair, 2021). This was achieved by clearly defining the factors and accurately measuring them, coupled with the use of multiple indicators for each factor category (Neumayer et al, 2017). To enhance clarity, the questionnaire underwent a pre-test followed by necessary adjustments. The reliability was then measured by Cronbach's Alpha and Composite Reliability, which assesses the internal consistency within the sample by correlating the individual items (Hair, 2013). The validity of each indicator was determined based on the calculated outer loading values, with a value above 0.50 signifying validity.

Structural Model Estimation

In the Figure 2 depicted, SEM framework displayed the relationship between RSE, PSS, and their moderation interaction (RSE*PSE) on RP. First, the model reveals path from RSE on RP show (*β: 0.074, t-value: 2.536, p-value: 0.011)* indicating positive connection statistical significance. Furthermore, the path moderation interaction (RSE*PSE) on RP show (*β:0.098, t-value: 4.066, p-value: 0.000)* suggests that the interaction between RSE and PSE has a significant positive effect on RP.

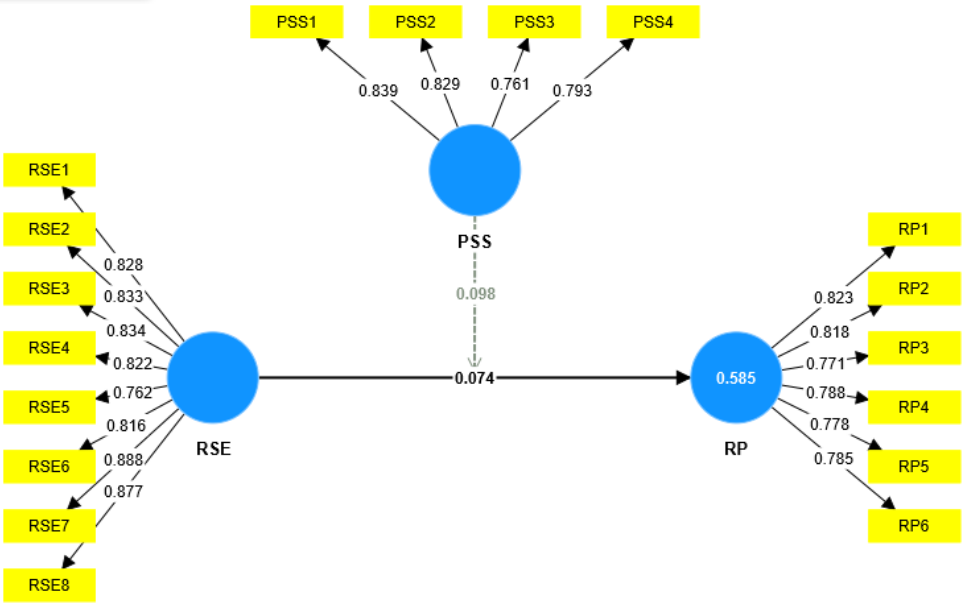

Figure 2. *Structural Estimation Results*

Table 3 indicates the R-Squared statistic for the variable RP, which stands at 0.585. This statistic reflects the proportion of variance in the RP that can be explained by the independent variables (RSE and PSS). An R^2 value of 0.585 intends that 58.5% of the variability in RP is accounted for by the model. This is a substantial proportion, suggesting the factors considered in the analysis have a significant effect on RP.

Table 3. *R-Square*

Variable	R-Square
Research Productivity (RP)	0.585

Hypothesis Testing Results

Hypothesis testing results harnesses the power of bootstrapping to lend statistical strength to the SEM estimates, providing a reliable foundation for inference. The latter subsection confronts the hypotheses head-on, scrutinizing the paths and interrelationships within the SEM framework to discern the empirical truths that lie within.

Table 4. Hypothesis Testing Result

Hypotheses	Correlation Path	β	STDEV	t-values	p-values	Result
H1	RSE → RP	0.074	0.028	2.536	0.011	Supported
H2	RSE*PSE → RP	0.098	0.024	4.066	0.000	Supported
	PSS → RP	0.702	0.029	25.210	0.000	

Table 4 delineates the results from hypothesis testing. It summarizes the directional influences and statistical significances of two hypothesized relationships. Hypothesis 1 (H1) proposes that postgraduate students' RSE positively affects their RP. Path coefficient for respective hypothesis is 0.074, which indicates a positive relationship. The t-value of 2.536 exceeds the critical value typically used for significance testing (commonly set at 1.96 for a 95% confidence level), and the p-value is 0.011, which is below the conventional threshold of 0.05 for statistical significance. Hence, the data supports H1, affirming that higher levels of RSE are associated with elevate postgraduate students RP.

Hypothesis 2 (H2) asserts that PSS enhances the effect of RSE on RP. Second hypothesis is also suggested by the data, with beta coefficient is 0.098 suggesting a strengthening effect of PSS on between RSE and RP correlation. The t-value is 4.066, which is well above the standard cutoff for significance, and the p-value is 0.000, indicating a highly significantly result. Therefore, H2 is supported, suggesting that when postgraduate students perceive greater support from their supervisors, their self-efficacy contributes even more strongly to their research productivity.

DISCUSSION

Research Self-Efficacy to Research Productivity

Hypothesis 1 (H1) proposes that postgraduate students' RSE positively affects their RP are supported. Drawing from SCT, RSE is shaped by experiences of mastery, vicarious learning through observation, verbal encouragement, and emotional states (Nazari et al., 2021; Ocampo et al., 2022). Successful research endeavours typically bolster self-efficacy, while setbacks can undermine it (Petko & Sivo, 2020). For example, Indonesian academics with a track record of publication successes are likely to possess robust RSE, while those encountering repeated rejections may experience diminished confidence. Additionally, observational learning and social benchmarks—seeing peers or mentors succeed in research—can augment one's self-efficacy (Bagdi & Bulsara, 2023). A junior academic's RSE might be buoyed by the achievements of a more seasoned researcher. Moreover, constructive feedback from respected sources can reinforce an someone belief in their research capabilities (Mensah et al., 2023). Academics receiving encouragement to persist and excel are thus more inclined to advance their research skills and develop stronger RSE beliefs. Emotional and psychological states prior to and during research tasks also contribute to the development of RSE (Niehaus & Reading, 2018). Align with prior research (Garwe, 2020; Aboagye et al., 2021; Amirian et al., 2023), this study utilizes SCT to explore the effect of Indonesian postgraduate students RSE on RPR. SCT integrates cognitive and behavioral perspectives to elucidate human actions (Bagdi & Bulsara, 2023), asserting that individual factors, behavior, and environmental contexts mutually influence one another (Fatimah et al., 2022). At SCT's core lies the concept of self-efficacy, which is a person perception of their ability to execute a given task (Orakcı et al., 2023).

Within the Indonesian higher education landscape, RSE is envisioned as the confidence with which academics approach research endeavours. Previous studies have indicated that beliefs in one's own self-efficacy can forecast the ability of faculty members to engage in research and develop effective research agendas (Hill et al., 2022; Sacre et al., 2023). Furthermore, RSE correlates with research output, task-specific performance, and perseverance in task completion. Research experience and mentorship emerge as pivotal factors in enhancing students' RSE, contributing to positive research experiences (Lambie et al., 2014; Poh & Kanesan, 2019). This association is vital in distinguishing the research trajectories of doctoral students in various disciplines, where those on research paths exhibit higher levels of RSE compared to their counterparts focused on clinical practice (Pasupathy & Siwatu, 2014; Pasupathy, 2018). Empirical studies support this theoretical argument. For instance, Puente-Díaz (2016) discovered that research self-efficacy significantly forecasts research productivity among doctoral psychology students. Similarly, Tiyuri et al. (2018) showed that increased research self-efficacy correlates with enhanced research output among faculty members, with research self-efficacy affecting research productivity by influencing related factors like research anxiety and procrastination (Fan et al., 2019). Within the higher education institutions of Indonesia, cultivation of postgraduate students RSE is an educational imperative, particularly given the challenges that typically accompany research within a developing nation (Gruzdev et al., 2020). These students are often faced with distinctive constraints that include, but are not limited to, limited funding, restricted access to cutting-edge technology and databases, and a scarcity of research-focused university due to broader teaching obligations (Qureshi et al., 2021).

The concept of RSE is profoundly influential on postgraduate students' Research Productivity. Students who possess a robust belief in their research abilities are observed to be less susceptible to the deterrents of research anxiety and the habitual delays of procrastination, which are notably detrimental to productive scholarly pursuits (Uwizeye et al., 2021). This heightened sense of RSE propels them towards self-regulated learning, an approach where they

are not only active participants in setting research objectives but are also vigilant in their progress, adaptable in their strategies, and receptive to critical feedback, all of which are practices that significantly contribute to their research output (Zimmerman, 2000; Panadero et al., 2017). Given the limited resources that often characterize the research landscape in developing countries, the ability of these students to manage and allocate resources effectively, as postulated by the conservation of resources theory, is particularly vital (Lee et al., 2020; Ahmed et al., 2017). This skill set enables them to prioritize effectively and work efficiently, avoiding the pitfalls of burnout (Franke & Arvidsson, 2011). Moreover, students with higher RSE tend to foster stronger support networks; they are proactive in seeking guidance and are likely to attract mentorship from supervisors and collaborative opportunities with peers, which not only provides critical feedback but also serves as an emotional and motivational boon for their research activities (Ali et al., 2021). Resilience and effective coping mechanisms, hallmarks of students with significant RSE, facilitate persistence in research despite the myriad of challenges and obstacles that may arise. This resilience is a crucial driver of productivity, especially in a developing country where resource constraints and infrastructural limitations are more pronounced (Peng, 2015). Furthermore, high RSE is intertwined with intrinsic motivation, a condition where students are driven by the inherent satisfaction derived from research activities. This intrinsic motivation often leads to deeper engagement and a higher degree of productivity, critical in a setting where external incentives and resources may be limited (Ryan & Deci, 2000).

Perceived Supervisory Support enhance Research self-efficacy on Research Productivity

Hypothesis 2 (H2) asserts that Perceived Supervisory Support (PSS) enhances the effect of RSE on RP. In the evolving landscape of Indonesian universities, the role of Perceived Supervisory Support (PSS) is increasingly recognized as pivotal for reinforcing RSE among postgraduate students, which is essential for amplifying their RP in a developing nation context. Social cognitive theory postulate that self-efficacy is cultivated not just through personal accomplishments but also through social reinforcement and vicarious learning, where supervisors, by offering mentorship, feedback, and encouragement, become vital agents in nurturing students' research confidence (Ruzek et al., 2016). This, in turn, propels motivation and productivity. Aligned with self-determination theory, an autonomy-supportive supervisory approach satisfies the psychological needs of postgraduate students, fueling their sense of competence and autonomy. Such perceived support (PSS) translates into a higher sense of self-efficacy (RSE), bolstering intrinsic motivation and deepening research engagement, thus improving productivity (Tierney & Lanford, 2016; Martinez et al., 2019). Furthermore, feedback intervention theory underscores the importance of constructive feedback from supervisors, which clarifies performance expectations and fosters improvement. The positive reception and application of such feedback solidify RSE, and consequently, RP (Tang et al., 2020).

In the framework of resource conservation theory, supervisory support is seen as a critical resource that aids students in coping with stress, conserving energy, and dedicating more to their research, thereby fortifying both their self-efficacy and productivity (Amirkhandaghi et al., 2013). Empirical evidence from various fields, including academia, supports the idea that PSS positively enhance the correlation between self-efficacy and performance outcomes, suggesting that similar effects are observable in Indonesian postgraduate research settings (Sarstedt & Mooi, 2019). The mentorship aspect of supervisory roles provides comprehensive support, encompassing academic guidance, career counselling, and psychological support, which collectively enhance students' research self-efficacy (Ashrafi-Rizi et al., 2015). This broad-spectrum mentorship instils a stronger sense of research direction and capability in students, thus leading to heightened productivity (Eby et al., 2007; Khuram et al., 2021). Moreover, a nurturing supervisory relationship contributes to a learning atmosphere and climate that is fosters to risk-taking and innovation, bolstering students' confidence to delve into uncharted research territories, which is crucial for a developing country where academic exploration is especially valued (Eccles & Roeser, 2011). Goal alignment fostered through perceived supervisory support engenders a symbiotic academic partnership, wherein the investment of effort and persistence by students is amplified, positively influencing their self-efficacy and productivity (Locke & Latham, 2002; Kareshki & Bahmanabadi, 2013). Additionally, supervisors who empower their students by delegating autonomy, providing resources, and facilitating skill development, not only boost the students' efficacy in their research capabilities but also inspire them to pioneer innovative research practices, ultimately enhancing productivity (González-Ocampo & Castelló, 2019). In summary, the correlation between PSS

and RSE take part in an urgent role to shape Indonesian postgraduate students research outcomes, emphasizing the substance of a supportive and empowering academic culture in the advancement of research within a developing nation's higher education sector. The effect of PSS as moderator can be seen in Figure 3.

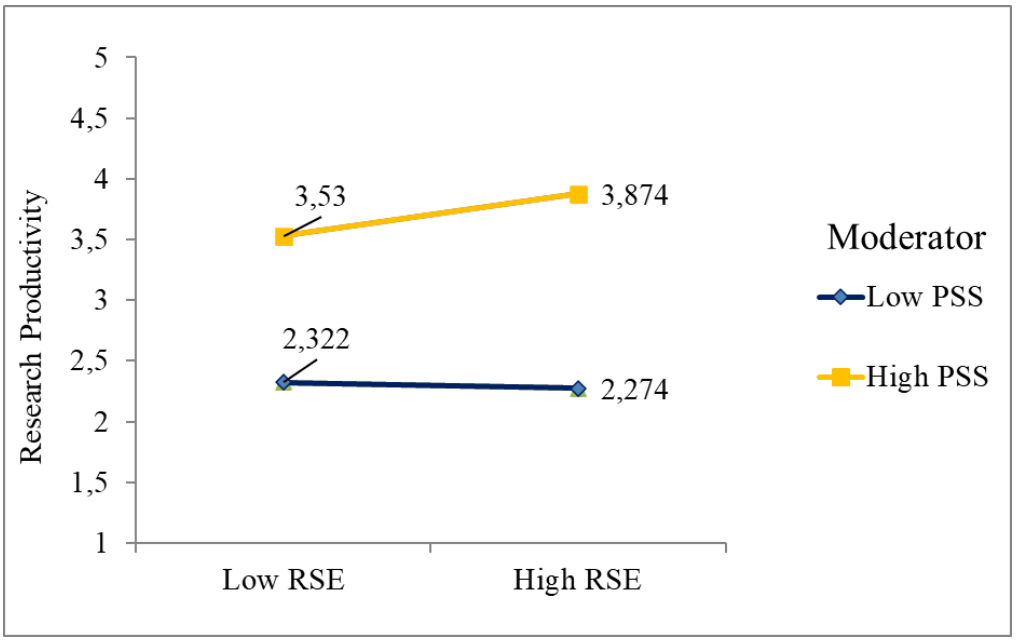

Figure 3. *PSS moderating effect illustration on relationship RSE to RP*

In addition, Figure 3 explain that for those with low RSE, the Research Productivity score is just above 2 for both low and high levels of PSS, indicating that PSS does not significantly differentiate productivity among those with low RSE. However, as RSE increases, the influence of PSS becomes apparent. For postgraduate students with high RSE, those with low PSS (blue line) show a slight increase in Research Productivity, but the score remains close to 2.3. In contrast, those with high PSS (orange line) experience a more substantial increase in productivity, with scores rising sharply to nearly 3.9. This suggests that while RSE is a crucial factor for productivity, its impact is significantly amplified when combined with high levels of supervisory support. In other words, high PSS acts as a moderator that strengthens toward positive correlation between RSE and RP. The graph clearly demonstrates that postgraduate students with greater levels of both RSE and PSS are likely to have the highest levels of RP.

CONCLUSION

This research sought to examine the impact of RSE on RP among postgraduate students and explore the moderating effect of Perceived Supervisory Support on this relationship. The research findings provide valuable understanding into the dynamics of research productivity in academic environment.

Firstly, the RSE has a significant positive influence on RP among postgraduate students. This finding aligns with theoretical perspectives that emphasize the importance of self-belief in one's research capabilities for achieving higher levels of productivity. Postgraduate students displaying robust RSE are more resistant to research anxiety and procrastination, paving the way for a more self-regulated and motivated approach to their scholarly endeavours. This heightened self-belief not only spurs students to diligently set, monitor, and adapt research objectives but also equips them to effectively allocate their limited resources. Ultimately, the intrinsic motivation fuelled by a solid sense of RSE ignites a passion for research, leading to heightened engagement and productivity. It proposes that students who are self-assured in their research skills are more distinctly possible to engage and attract in productive research activities and achieve better outcomes.

Secondly, the study found that PSS strengthens the positive influence of RSE on RP among postgraduate students. Supervisors are increasingly viewed as integral to nurturing postgraduate students' research confidence, thereby fuelling their scholarly output. PSS, by fulfilling the psychological needs for competence and autonomy, deepens students' intrinsic motivation and engagement in research activities. Such supervisory support not only offers valuable feedback that reinforces RSE but also provides resources and emotional backing, helping students to navigate the stressors of academic research. The moderating role of PSS, as revealed, is crucial in realizing the full potential of postgraduate students' research endeavours in the Indonesian. It underscores the importance of fostering a supportive academic environment where students feel encouraged and guided by their supervisors, which in turn amplifies the impact of their self-efficacy on their research output.

Study Limitation and Future Research Directions

Firstly, the cross-sectional research design limits the ability to infer causal interconnection. Longitudinal studies are needed to establish the directionality of the relationships and to observe how these dynamics evolve over time. Secondly, the selection of postgraduate students from a specific geographic area may restrict the broader applicability of the findings. Future studies could replicate this research in diverse cultural and academic settings to evaluate the generalizability of the results. Thirdly, the research survey relied on self-reported measures, which are vulnerable to social desirability bias and perhaps not accurately capture actual research productivity. Incorporating objective measures of research productivity, such as publication count or citation metrics, could provide a more extensive understanding of the construct.

Fourthly, this research focused on the moderating role of PSS. Future research could explore other potential moderators, such as research resources, institutional support, or peer collaboration, to gain a more distinction insight of the factors determines the relationship between RSE and RP. Lastly, the study did not examine underlying the relationship between RSE and RP. Future studies could explore mediating variables, such as research motivation, research engagement, or academic resilience, to elucidate the pathways through which self-efficacy influences productivity.

Theoretical and Practical Implication

This study's exploration of the relationships between RSE, PSS, and RP among postgraduate students yields valuable theoretical and practical insights. Theoretically, the findings extend social cognitive theory by illustrating determining role of research self-efficacy over academic research productivity, thereby enriching the self-efficacy literature. Furthermore, the study integrates support theory by highlighting the moderating influence of Perceived Supervisory Support, contribute a nuanced insight of the connection between social support and individual cognitive factors specially in academic settings. It underscores the multifaceted nature of RSE as influenced by mastery experiences, vicarious learning, and social persuasion, thereby expanding the theory to incorporate the nuances of a developing country's educational landscape. Additionally, it enriches the theoretical framework by demonstrating how PSS acts as a critical moderator that not only enhances RSE but also serves to substantially amplify the RSE-RP relationship.

Moreover, this research has practical implications for enhancing research productivity. Academic institutions can design research training programs to increase students' research self-efficacy levels and develop strategies to facilitate supportive supervisory relationships. They can also establish peer support networks and formal mentoring programs to serve as critical resources and sources of support for postgraduate students. Finally, incorporating self-reflective or goal-setting activities can enable students to become more aware of their research abilities and leverage them appropriately. The findings advocate for mentorship programs that reinforce feedback mechanisms and encourage resource-sharing to mitigate the common challenges faced by postgraduate students in developing countries. For supervisors, the research underscores the importance of being an accessible source of encouragement and guidance, fostering an environment that enhances students' self-regulatory learning and intrinsic motivation. These insights have profound implications for policy formulation, supervisor training, and the overall strategic

approach to research within Indonesian universities, aiming to maximize the potential of postgraduate students' scholarly contributions.

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