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Journal of Social Studies Education Research

*Sosyal Bilgiler Eğitimi Araştırmaları Dergisi*

2023:14 (4), 350-378

# Research Support and Industry Participation to Increase the Global Competence in Higher Education

Krisna Sujaya[1]

## Abstract

This study examines the nuanced interplay among Research Support, Industry Participation, Independent Learning, and Independent Campus (Merdeka Belajar Kampus Merdeka, MBKM), examining their collective influence on graduate quality within the framework of Indonesian higher education. Employing a quantitative methodology, the research investigates how research support and industry participation impact MBKM and subsequently influence graduate quality, with MBKM functioning as a mediator. The study's outcomes validate the substantial contributions of research support and industry participation in shaping both MBKM and graduate quality, underscoring the interconnected nature of these variables. Notably, MBKM emerges as a pivotal mediator, establishing a link between the supportive structures and industry collaborations, thereby fostering improved graduate outcomes. This research makes significant contributions by advancing theoretical understanding, specifically by extending existing frameworks to integrate the mediating role of MBKM. In practical terms, the study yields actionable insights for educational institutions and policymakers, underscoring the significance of robust research support, fruitful industry collaborations, and the effective implementation of MBKM. Limitations of the study include its reliance on a quantitative approach and the potential influence of contextual constraints. Recommendations entail the ongoing adaptation of MBKM and policy adjustments to align with the dynamic demands of the workforce. In conclusion, this study presents a comprehensive framework for enhancing higher education practices in Indonesia, ultimately promoting graduate quality and relevance.

***Keywords:*** *Graduate quality, industry participation, MBKM, research support,*

## Introduction

Higher education stands as a pivotal element in fostering human resource development and driving a country's economic growth (Moremoholo, 2023; Nwosu et al., 2023; Odularu et al., 2022; Olo et al., 2021; Patimo & Lucero, 2021; Zhu & Li, 2017). In Indonesia, a concerted focus has been placed on enhancing the quality of higher education and equipping graduates to meet the challenges of an increasingly intricate job market (Cahyadi et al., 2021; Suharno et al., 2020). A significant initiative in this direction is the Independent Learning Independent Campus (*Merdeka Belajar Kampus Merdeka,* henceforth MBKM), designed to grant students greater autonomy in

[1]*Dr. Universitas Pendidikan Indonesia, Bandung, Indonesia, Email: krisnasujaya@upi.edu*

shaping their educational paths and developing their competencies (Dian et al., 2023; Simarmata & Mayuni, 2023; Wulandari et al., 2023).

An integral facet of MBKM is its incorporation of industry and research support into the educational process (Rosyanafi et al., 2023; Yulianto et al., 2022). Industry engagement is recognized as a crucial partnership in shaping curriculum design, providing practical experiences for students, and fostering relevant research aligned with the dynamic needs of the job market (Jackson et al., 2017; Li, 2022; Venske, 2021).

Active industry participation in MBKM is anticipated to ensure that graduates possess qualifications and competencies aligned with current industry demands (Murnawan et al., 2022). While this concept holds promise, a comprehensive analysis is imperative to ascertain the true impact of research support and industry involvement in MBKM on the quality of graduates. In this regard, the study aims to scrutinize the tangible effects of collaboration between higher education institutions and industry on the development of graduate quality. The focus of this study will be on applied research, delving into the implications of research support and industry participation in MBKM on graduate quality. The research endeavors to pinpoint specific benefits stemming from industry engagement in higher education, encompassing aspects such as curriculum relevance, hands-on student experiences, job opportunities, and the graduates' ability to meet the dynamic demands of the job market.

With a nuanced comprehension of the ramifications of industry involvement in MBKM, this research endeavors to offer invaluable insights to education policymakers, higher education institutions, and pertinent stakeholders in their endeavors to elevate the quality of higher education in Indonesia. Moreover, the anticipated research findings are poised to lay the groundwork for the formulation of more effective strategies in integrating industry into the higher education system. Ultimately, these strategies aim to cultivate graduates who are better equipped to confront the dynamic challenges of the job market.

Despite prior studies examining industry involvement in higher education, a notable research gap persists regarding the tangible impact of research support and industry participation within the context of MBKM in Indonesia. Previous research has predominantly emphasized conceptual aspects rather than delving into the practical implications of this collaboration. This research aims to make a distinctive contribution by probing into how industries and universities can collaborate to foster graduates who are more adept for the workforce. It seeks to provide deeper insights into

how this collaboration influences the development of graduate quality within the framework of MBKM, which represents a relatively new higher education initiative in Indonesia.

The driving force behind this research stems from the growing significance of MBKM as a curriculum reform initiative in higher education within Indonesia. By garnering a more profound understanding of the role of industry involvement in realizing MBKM's objectives, this research aims to offer precise guidance for universities, industries, and policymakers. The study holds considerable importance, providing valuable insights for education policymakers, aiding universities in elevating the quality of their graduates, and offering benefits to students by elucidating the impact of industry involvement on their career development. Moreover, the research remains pertinent to the broader contexts of economic growth and human resource development in Indonesia.

The research questions for the study are as follows:

1. To what extent does industry involvement in MBKM influence curriculum design and the implementation of higher education programs, considering the contributions of industry research in curriculum planning?
2. How does industry involvement in MBKM impact the development of practical skills and the capabilities of graduates produced by higher education programs, and what role does industry research play in enhancing the quality of graduates?
3. What are the factors influencing the success of industry involvement in supporting the quality of graduates within the framework of MBKM, including the research elements integrated into the collaboration between industry and universities?
4. What specific recommendations can be provided to universities, industries, and relevant stakeholders to improve their collaboration and enhance the quality of graduates, including suggestions related to the development of joint research between industry and higher education?

## Literature Review and Hypothesis Development

### Research Support and MBKM

Barnard and Van der Merwe (2016) define research support as the provision of financial, infrastructural, or intellectual resources aimed at enabling and enhancing research activities within

higher education institutions or other research organizations. This support encompasses funding for research projects, access to state-of-the-art facilities, and collaboration with experts from various industries. Within the context of MBKM, research support assumes a pivotal role by fostering collaboration between universities and industries, creating a dynamic and relevant research ecosystem (Abdul et al., 2022).

This collaboration facilitates the development of research-driven curricula, innovative teaching approaches, and ensures the knowledge produced aligns with the evolving demands of the job market (Haneberg et al., 2022). Fahmi et al. (2023) assert that integrating research support within the MBKM framework is instrumental in nurturing a culture of research excellence, thereby contributing to the overall quality of graduates, who are better prepared to meet the challenges of the contemporary workforce. Therefore, the proposed hypothesis is as follows:

**$H_1$: Research Support impacts on MBKM**

**Research Support and Graduate Quality**

As per Crosling et al. (2015), research support encompasses the provision of various resources, including financial investments, access to advanced infrastructure, and intellectual contributions. This support is directed at fostering and enriching research activities within educational institutions and research organizations. The relationship between research support and graduate quality is intrinsically interconnected, as research support plays a pivotal role in shaping the overall quality of graduates (Clements et al., 2016; Fenton & Barry, 2014; McCormick et al., 2013) . Generous research support allows educational institutions to create an environment that nurtures innovative and research-driven teaching methodologies (Yamamoto, 2018).

As a result, this environment fosters the development of curricula highly attuned to the evolving demands of the job market (Ondieki Makori et al., 2013). Graduates, in return, gain substantial benefits by acquiring practical skills, an in-depth understanding of industry trends, and an enhanced capacity for adaptability (Helyer & Lee, 2014; Nevhudoli & Olive Netshandama, 2023). This equips them to adeptly confront and navigate the dynamic challenges presented by the workforce, ultimately contributing to an enhancement in graduate quality (Griffith et al., 2016; Nurlaili, 2023). In summary, research support plays a crucial role in shaping and elevating the quality of graduates by aligning education with contemporary job market's requirements (Cleary

et al., 2017; Donald et al., 2018; Tomlinson, 2021). Consequently, the formulated hypothesis is as follows:

**$H_2$: Research Support impacts on Graduate Quality**

**Industry Participation and MBKM**

Al Yakin et al. (2023) explain that industry participation involves the active engagement and involvement of various sectors and organizations within the industry in the processes, activities, and initiatives of MBKM. This engagement can take various forms, such as collaboration on curriculum development, providing practical training opportunities, offering industry insights and expertise, and supporting research endeavors aligned with the demands of the job market. The relationship between industry participation and MBKM is fundamentally intertwined, serving as a cornerstone of MBKM's mission to create a dynamic and responsive higher education ecosystem (Probowulan, 2022; Rahmawati & Mugiyanti, 2021; Rosyanafi et al., 2023). Through active industry involvement, MBKM ensures that educational programs are directly aligned with the practical needs and trends of the job market (Ingtias et al., 2022). This symbiotic relationship enables MBKM to produce graduates well-prepared for the workforce, ultimately contributing to the success and relevance of MBKM's educational initiatives. Consequently, the formulated hypothesis is as follows:

**$H_3$: Industry Participation impacts on MBKM**

**Industry Participation and Graduate Quality**

Perkmann et al. (2013) argue that industry participation involves the active engagement and involvement of various sectors and organizations within industries in educational processes, curricular development, practical training opportunities, and the facilitation of research endeavors. This engagement acts as a bridge between academic knowledge and industry needs. The relationship between industry participation and graduate quality is integral, as it significantly influences the overall caliber of graduates (Rawlinson & Dewhurst, 2013; Shah et al., 2015; Tomlinson, 2017). Industries, through active participation in the educational ecosystem, can contribute to the development of curricula closely aligned with the practical requirements of the job market (Koul & Nayar, 2021).

According to Hong (2022), graduates benefit from this engagement by acquiring hands-on experience, real-world skills, and a profound understanding of industry-specific trends, thereby becoming better equipped to meet the demands of the workforce. This mutually beneficial relationship underscores the pivotal role that industry participation plays in enhancing the quality of graduates and preparing them for the job market. Therefore, the hypothesis under consideration is outlined as follows:

**$H_4$: Industry Participation impacts on Graduate Quality**

**MBKM and Graduate Quality**

MBKM is an initiative within Indonesian higher education curricula that aims to provide students with increased autonomy in crafting their educational paths, fostering competency development, and enriching their overall educational experience (Rotty et al., 2022). The relationship between MBKM and graduate quality is intrinsic, as the MBKM's mission revolves around creating a dynamic and responsive higher education ecosystem (Ernawati et al., 2022). By granting students more freedom to tailor their education, MBKM allows them to explore and develop skills aligned with their interests and the demands of the job market (Sunhaji et al., 2022). This, in turn, contributes to higher graduate quality, as students become better prepared for the workforce, equipped with practical skills, critical thinking abilities, and a deeper understanding of their chosen field (Mursitama et al., 2022; Pudyanti & Pham, 2023; Sobri et al., 2023).

In essence, MBKM empowers students to shape their education in ways that enhance the quality of graduates. This alignment of qualifications with the dynamic demands of the job market aims to bolster overall readiness for successful careers (Febrianti et al., 2023; Supraptono et al., 2022). Therefore, the presented hypothesis can be articulated as follows:

**$H_5$: MBKM impacts on Graduate Quality**

**MBKM as Mediator**

MBKM can function as a mediator in diverse educational contexts. In this role, MBKM plays a pivotal part in fostering communication and collaboration among various stakeholders in higher education, including students, educational institutions, and industries. Acting as a bridge, MBKM connects students with opportunities to tailor their education and engage in practical experiences while also connecting educational institutions with the evolving needs of the job market (Sa'diyah

et al., 2022). Through this mediation, MBKM empowers students to shape their educational journeys, aligning them with real-world demands and ultimately enhancing graduate quality. In summary, MBKM serves as a mediator that facilitates interaction among students, educational institutions, and industries, ensuring that educational experiences closely align with the needs of the job market and promote higher graduate quality. Thus, the hypothesis being suggested can be expressed in the following manner:

**$H_6$: MBKM mediates the relationship between Research Support and Graduate Quality**

**$H_7$: MBKM mediates the relationship between Industry Participation and Graduate Quality**

## Methods

### Design

This research employed a quantitative methodology utilizing a survey design, as outlined by Cresswell (2014). The study encompassed five hypotheses with direct effects and two hypotheses with indirect effects. The principal variables under examination were research support and industry participation in the implementation of MBKM, aimed at enhancing the quality of graduates in higher education within Indonesia. Data were collected from students, academic staff, and industry representatives actively involved in MBKM. The survey specifically targeted various aspects of industry participation within MBKM and its impact on graduate quality. The collected data underwent rigorous statistical analysis to test the research hypotheses and unveil significant relationships and trends. Furthermore, the quantitative analysis provided a comprehensive understanding of the direct influence of industry participation within MBKM on graduate quality. The research was conducted at Universitas Pendidikan Indonesia in Bandung.

### Study Sample

The research encompassed a population consisting of students, academic staff, and industry representatives engaged in MBKM across students of Universitas Pendidikan Indonesia. The study sampling was selected using a random and representative sampling method and 230 participants were selected. The participants were the fifth semester of senior students in the faculty of education at Universitas Pendidikan Indonesia Bandung. Sampling of this study was a population sample because all students in the fifth semester of Education faculty were selected as participants.

**Research Instrument**

The instruments used in this recent study comprised four types of survey questionnaires, drawing inspiration from works by Poitras et al. (2019) and Cresswell (2014). The researcher-designed instrument consisted of a 34-item questionnaire to assess research support (RES=7 items), industry participation (IND=7 items), MBKM (10 items), and graduate quality (GQUAL=10 items). Employing a rating scale ranging from 1 to 5 (very disagree to very agree), the questionnaires gauged graduate quality across dimensions such as practical skills, relevant knowledge, and job readiness. This rating scale served as a valuable tool for objectively evaluating the impact of industry engagement within MBKM on graduate quality. Respondents provided ratings based on their perceptions of graduate quality, particularly in terms of practical skills, pertinent knowledge, and job market readiness. The scale facilitated a systematic and quantifiable measurement of the influence of industry participation within MBKM on graduate quality. The survey questions were crafted to delve into respondents' perceptions, experiences, and expectations regarding industrial involvement in MBKM and its impact on graduate quality. In addition to the survey, in-depth interviews were conducted with selected respondents, including representatives from universities and industries. These interviews aimed to elicit insights on best practices, barriers, and elements of research engagement. Furthermore, documents related to MBKM, educational programs, and research collaborations between industries and universities were scrutinized to provide comprehensive contextual insights (See Appendix 1).

**Validity and Reliability of the Instrument**

The analysis of bootstrapping using Smart PLS to find the validity and reliability of the instrument of this study is illustrated in Figure 1. Validity and reliability are crucial aspects that ensure the robustness and accuracy of measurement instruments in research (Poitras et al., 2019). According to Heale and Twycross (2015), validity pertains to the extent to which an instrument accurately measures its intended construct, ensuring that it assesses the targeted variable without introducing bias or error. In our study, data validity is affirmed through high outer loading values, indicating that each item within the constructs—Research Support, Industry Participation, MBKM, and Graduate Quality—effectively captures the essence of its respective construct. On the other hand, reliability pertains to the consistency and stability of measurements over time and across different conditions. A reliable instrument produces consistent results when administered under similar

circumstances (Frost et al., 2007). The recent research demonstrates reliability through high internal consistency measures, including Cronbach's Alpha, rho_A, and Composite Reliability (Dolinting & Pang, 2022). These values, surpassing accepted benchmarks, affirm the stability and dependability of our measurement model. In conclusion, the validity and reliability of our data underscore the reliability of the measurement instruments, ensuring that the collected data accurately represent the intended constructs and can be consistently relied upon for meaningful analyses and interpretations. The table provides a comprehensive analysis of factor loading, reliability, and validity measures for each item within the constructs of Research Support, Industry Participation, MBKM, and Graduate Quality (See Appendix 2).

**Data Collection**

The study data was gathered through a four-type survey questionnaire measuring students' perceptions on (1) research support (RES=7 items), (2) industry participation (IND=7 items), (3) MKBM implementation (10 items), and (4) quality graduate (GQUAL=10 items). A total of eight classes, comprising 240 senior students at Universitas Pendidikan Indonesia in Bandung, were provided with the paper-pencil-based survey questionnaire. The survey took place twice, with the first four classes participating from 08:00 to 09:30 am and the remaining four classes from 10:00 to 11:30 am. Out of the 240 students, 230 returned the questionnaire, and the researcher verified that all 230 responses were valid for data collection.

**Data Analysis**

The data analysis was conducted in two stages. First, it aimed to assess the validity and reliability of the 34 items in the survey questionnaire and to test hypotheses H1 to H2 in this study. Both analyses were performed using Smart PLS, known for its accuracy and precision in handling multiple variables in research. The validity and reliability analysis characterized the quality of the questionnaire, while the hypothesis testing determined the significance of H1 to H7.

## Results

The primary findings of this study involve the hypothesis testing of H1 to H7, analyzed using the Smart PLS program. Before conducting the hypothesis testing, normality and homogeneity tests

were performed to demonstrate that the data are normally distributed, and the samples are homogeneous within the population.

**Normality Test**

The normality test serves the purpose of demonstrating that the sample data follows a normal distribution from the population, which is a prerequisite for statistical tools such as t-tests or ANOVA. In this study, the normality test was conducted using the One-Sample Kolmogorov-Smirnov Test. Details of the normality test for the instruments in this study are presented in Table 1.

**Table 1**
Normality Test (*One-Sample Kolmogorov-Smirnov Test)*

| | | Unstandardized $X_1$ | Unstandardized $X_2$ | Unstandardized Y | Unstandardized Z |
|---|---|---|---|---|---|
| N | | 230 | 230 | 230 | 230 |
| Normal Parameters[a,b,c,d] | Mean | ,0000000 | ,0000000 | 0,00000 | 0,00000 |
| | Std. Deviation | 3,410 | 3,410 | 3,512 | 3,512 |
| Most Extreme Differences | Absolute | ,054 | ,054 | 0,056 | ,054 |
| | Positive | ,024 | ,024 | 0,031 | ,024 |
| | Negative | -,034 | -,034 | -,032 | -,034 |
| Kolmogorov-Smirnov Z | | ,767 | ,832 | ,743 | ,821 |
| Asymp. Sig. (2-tailed) | | ,876 | ,712 | ,845 | ,732 |

a. Test distribution is Normal.
b. Calculated from data.

The results of the Kolmogorov-Smirnov test, as presented in Table 1, show the Z values for the X1, X2, Y, and Z data as follows: 0.767, 0.832, 0.743, and 0.821, respectively, with corresponding probabilities of 0.876, 0.712, 0.845, and 0.732. The consistent p-values of all data being above $\alpha = 0.05$ signify that all the data are normally distributed.

**Homogeneity**

The homogeneity test assesses the level of uniformity among sampling units within the population. Homogeneity implies that the sample data are similar or identical, indicating that respondents share commonalities in terms of competency, age, or level of study. In this study, homogeneity was calculated using the t-test coefficient, and the results appear in Table 2.

**Table 2**
*Coefficient of T-Test*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 9,929 | 1,562 | | 1,356 | ,075 |
| | $X_1$ | ,451 | ,063 | ,391 | 1,152 | ,064 |
| | $X_2$ | ,404 | ,062 | ,377 | 1,409 | ,076 |
| | Y | ,443 | ,061 | ,364 | 1,213 | ,067 |
| | Z | ,423 | ,065 | ,365 | 1,541 | ,079 |

From Table 2, the t-test is considered different if the t-count value is greater than t-table, denoted as > 1.65336. Conversely, if the t-count value is smaller than t-table, denoted as < 1.65251, then the t-test is considered not different. As indicated in Table 2, the t-count for all variables is 1.356. This implies that the t-count is < t-table 1.65251, thus, all H0(1,2,3,4) are accepted, and Ha(1234) are rejected. This signifies that all the data is homogeneous.

## Validity and Reliability

Validity and reliability of the instruments were assessed using the Smart PLS model, examining the coefficient of t-test, as illustrated in Figure 1.

### Coefficient of t-test

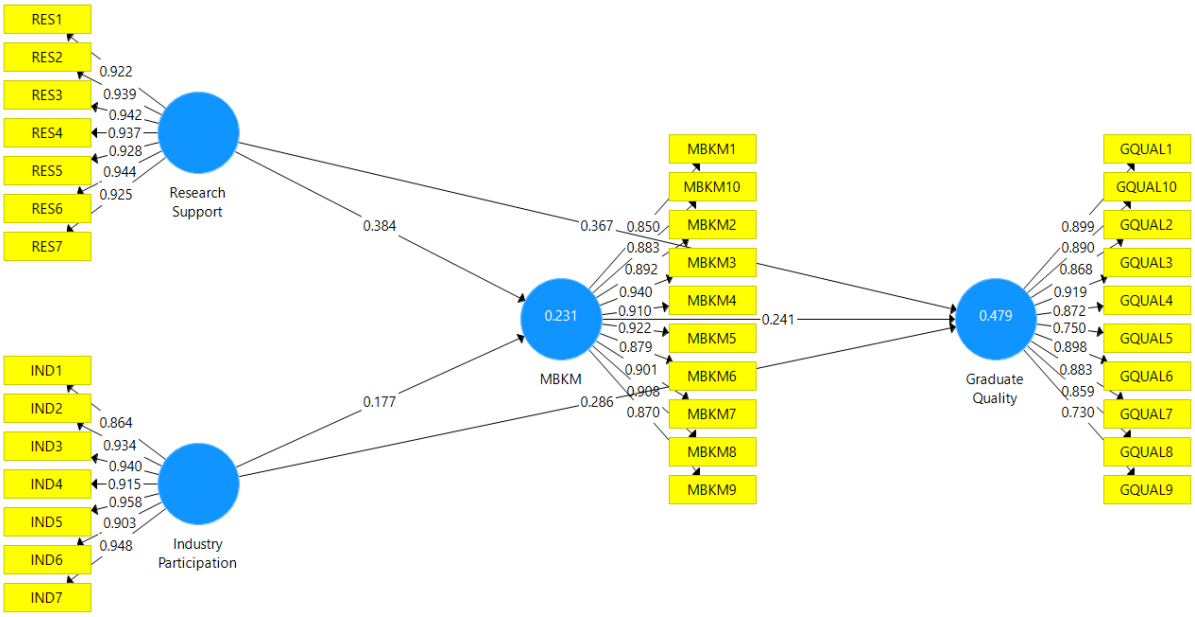


**Figure 1**
*PLS Algorithm*

The construct of Research Support shows high reliability and validity. Notably, item RES1 exhibits a strong outer loading of 0.922, indicating its substantial contribution to measuring the construct. The overall Cronbach's alpha score of 0.976 and rho_A of 0.976 reflect excellent internal consistency. The composite reliability (CR) of 0.98 further supports the reliability of the scale, and the average variance extracted (AVE) of 0.872 signifies good convergent validity. The items within the Industry Participation construct display robust outer loadings, with IND1 leading at 0.864. The overall reliability is evidenced through a high Cronbach's alpha score of 0.971 and rho_A of 0.978, ensuring internal consistency. The CR of 0.976 and AVE of 0.853 indicate satisfactory reliability and convergent validity. The MBKM construct exhibits strong reliability, with MBKM1 displaying a notable outer loading of 0.850. The high Cronbach's alpha score of 0.973 and rho_A of 0.975 confirm the internal consistency. The CR of 0.976 and AVE of 0.803 confirm the construct's reliability and convergent validity.

The construct of Graduate Quality presents a mix of outer loadings, with GQUAL1 leading at 0.899. While the overall Cronbach's alpha score of 0.960 and rho_A of 0.962 indicate excellent internal consistency, the CR of 0.966 and AVE of 0.738 suggest satisfactory reliability and convergent validity. Importantly, items GQUAL5 and GQUAL9, which initially raised concerns, also demonstrate valid measurements with loading values exceeding the 0.7 threshold. In summary, the reevaluation affirms that all data within the constructs of Research Support, Industry Participation, MBKM, and Graduate Quality are both valid and reliable, contributing to the robustness of the measurement model.

**Hypothesis Testing**

The hypothesis H1 (RES -> MBKM) is employed to determine whether research support (RES) influences the implementation of MBKM. The findings reveal that there is a statistically significant impact, indicating that support in research significantly affects the implementation of MBKM. The analysis of the hypotheses provides compelling evidence supporting the relationships between the constructs in the study. The original sample indicates a substantial relationship between Research Support and MBKM, with a mean effect size of 0.384 and a standard deviation (STDEV) of 0.072. The t-statistic of 5.345 is highly significant (p-value = 0.000), leading to the acceptance of H1. This suggests that the support provided in research significantly influences the implementation of MBKM.

H2 (RES -> GQUAL) establishes the relationship between research support (RES) and the quality of graduates (GQUAL). The analysis confirms a strong relationship between Research Support and Graduate Quality, demonstrated by a mean effect size of 0.367 and a low standard deviation of 0.059. The t-statistic of 6.253 is highly significant (p-value = 0.000), leading to the acceptance of H2. This indicates that support in research positively contributes to the quality of graduates.

H3 (IND -> MBKM) is designed to assess the impact of industry involvement (IND) on the implementation of MBKM. The results demonstrate a significant effect of Industry Participation on MBKM, with a mean effect size of 0.177 and a standard deviation of 0.056. The t-statistic of 3.162 is statistically significant (p-value = 0.002), supporting the acceptance of H3. This implies that active involvement from industries has a notable influence on the implementation of MBKM.

H4 (IND -> GQUAL) examines the impact of industry involvement (IND) on graduate quality. The analysis uncovers a significant relationship between Industry Participation and Graduate Quality, demonstrated by a mean effect size of 0.286 and a standard deviation of 0.053. The t-statistic of 5.432 is highly significant (p-value = 0.000), leading to the acceptance of H4. This suggests that industry participation significantly contributes to the quality of graduates.

H5 (MBKM -> GQUAL) evaluates the impact of MBKM on the quality of graduates (GQUAL). The results demonstrate a significant positive effect of MBKM on Graduate Quality, with a mean effect size of 0.241 and a standard deviation of 0.057. The t-statistic of 4.223 is highly significant (p-value = 0.000), supporting the acceptance of H5. This signifies that the implementation of MBKM is associated with improved graduate quality. In summary, Table 3 indicates that the statistical analysis provides strong support for all hypotheses, affirming the relationships between Research Support, Industry Participation, MBKM, and Graduate Quality in this study.

**Table 3**

*Path Result*

| Hypothesis | Construct*) | Sample | STDEV | T Statistics | P Values | Result |
|---|---|---|---|---|---|---|
| $H_1$ | RES -> MBKM | 0.384 | 0.072 | 5.345 | 0.000 | Accepted |
| $H_2$ | RES -> GQUAL | 0.367 | 0.059 | 6.253 | 0.000 | Accepted |
| $H_3$ | IND -> MBKM | 0.177 | 0.056 | 3.162 | 0.002 | Accepted |
| $H_4$ | IND -> GQUAL | 0.286 | 0.053 | 5.432 | 0.000 | Accepted |
| $H_5$ | MBKM -> GQUAL | 0.241 | 0.057 | 4.223 | 0.000 | Accepted |

*) RES=Research Support; IND=Industry Participation; MBKM=*Merdeka Belajar Kampus Merdeka*; GQUAL=Graduate Quality

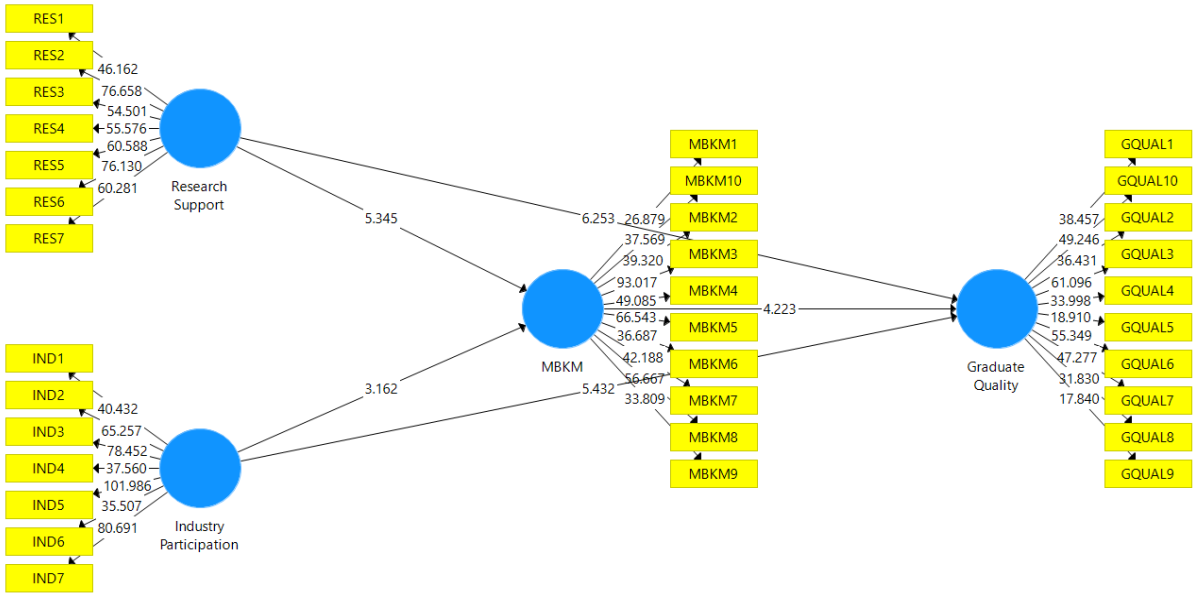


**Figure 2**
*Bootstrapping Result*

**Indirect effect**

The examination of indirect effects in statistical analyses or path modeling is a crucial aspect for researchers aiming to unravel intricate dynamics within their models. The primary objective is to understand the mechanisms through which an independent variable affects a dependent variable, elucidating the intermediary steps that facilitate this impact. This pursuit of understanding aims to validate theoretical models, ensuring that proposed indirect pathways align with observed data and contribute to the overall robustness of the research framework.

Beyond model validation, exploring indirect effects holds implications for policy and intervention strategies, offering insights into areas of influence that can be strategically targeted for expected outcomes. Furthermore, the accuracy in prediction is heightened, enabling researchers to consider nuanced interactions among variables. Scientifically, quantifying indirect effects contributes to theoretical advancements and empirical evidence, enriching the knowledge base in a specific field of study. Essentially, the analysis of indirect effects plays a multifaceted role, ranging from refining theoretical understanding to informing practical applications and contributing to the broader scientific discourse.

**Table 4**
*Mediation Result*

| Hypothesis | Construct*) | Original Sample | STDEV | T Statistics | P Values | Result |
|---|---|---|---|---|---|---|
| $H_6$ | RES -> MBKM -> GQUAL | 0.093 | 0.026 | 3.508 | 0.000 | Accepted |
| $H_7$ | IND -> MBKM -> GQUAL | 0.040 | 0.017 | 2.355 | 0.019 | Accepted |

*) RES=Research Support; IND=Industry Participation; MBKM=*Merdeka Belajar Kampus Merdeka*; GQUAL=Graduate Quality

The analysis of hypotheses involving multiple sequential relationships within the model reveals insightful findings (Table 4). Examining the pathway from Research Support to MBKM and subsequently to Graduate Quality, the original sample shows a mean effect size of 0.093 with a standard deviation (STDEV) of 0.026. The t-statistic of 3.508 is highly significant (p-value = 0.000), leading to the acceptance of H6. This suggests that the influence of Research Support on Graduate Quality is partially mediated by the implementation of MBKM. Similarly, the analysis of the pathway from Industry Participation to MBKM and then to Graduate Quality reveals a mean effect size of 0.040 and an STDEV of 0.017. The t-statistic of 2.355 is statistically significant (p-value = 0.019), leading to the acceptance of H7. This indicates that the impact of Industry Participation on Graduate Quality is also moderately mediated by the implementation of MBKM. In summary, both H6 and H7 are accepted, signifying that the relationships between Research Support and Graduate Quality, as well as Industry Participation and Graduate Quality are moderately explained by the intermediary role of MBKM. These findings shed light on the nuanced pathways through which these constructs interact, contributing to a more comprehensive understanding of the dynamics within the research model. Summary of the hypothesis testing is outlined as follows:

**$H_1$:** Research Support significantly impacts MBKM

**$H_2$:** Research Support significantly impacts Graduate Quality

**$H_3$:** Industry Participation significantly impacts MBKM

**$H_4$:** Industry Participation significantly impacts Graduate Quality

**$H_5$:** MBKM significantly impacts Graduate Quality

**$H_6$:** MBKM significantly mediates the relationship between Research Support and Graduate Quality

**$H_7$:** MBKM significantly mediates the relationship between Industry Participation and Graduate Quality

## Discussion

The acceptance of hypotheses H1 to H7 in the recent study carries significant managerial implications for the education sector in Indonesia. The findings underscore the importance of both Research Support and Industry Participation in shaping the landscape of higher education and the quality of graduates produced. This section will discuss each hypothesis of the current study.

The acceptance of H1 and H2 emphasizes the crucial need to enhance research support mechanisms within the educational framework. Institutions should invest in fostering a research-friendly environment, providing resources, mentorship, and opportunities for faculty to engage in meaningful research.

This not only strengthens the foundation of MBKM but also directly contributes to the overall quality of graduates by ensuring their exposure to and involvement in cutting-edge research. The significance of enhancing research support mechanisms aligns with the idea that robust research activities contribute to the overall quality of graduates (Abdul et al., 2022; Barnard & Van der Merwe, 2016; Haneberg et al., 2022). By fostering an environment that supports research, institutions can facilitate the development of critical thinking skills, creativity, and a deeper understanding of the subjects being studied. Exposure to cutting-edge research ensures that students are at the forefront of knowledge in their respective fields, preparing them for the dynamic and evolving demands of the workforce.

The recognition of the impact of Industry Participation (H3 and H4) underscores the necessity for robust collaborations between educational institutions and industries. To enhance MBKM and graduate quality, universities should actively seek partnerships with industries, facilitating real-world exposure, internships, and collaborative research initiatives. This aligns with the notion that graduates benefit significantly from industry-relevant experiences, preparing them more comprehensively for the dynamic demands of the workforce. The emphasis on industry participation (H3 and H4) highlights the importance of strong collaborations between educational institutions and industries, as such partnerships can significantly enhance the MBKM framework and contribute to the overall quality of graduates.

Actively cultivating partnerships with industries offers students invaluable exposure to the real-world, providing opportunities for internships and collaborative research. This form of engagement

serves as a vital link between theoretical knowledge acquired in classrooms and the practical skills demanded in the professional realm. Graduates who undergo experiences relevant to the industry are often more adept at meeting the dynamic challenges of the workforce, possessing a profound understanding of how their academic knowledge translates into real-world applications (Probowulan, 2022; Rahmawati & Mugiyanti, 2021; Rosyanafi et al., 2023). In essence, fostering collaborations between educational institutions and industries emerges as a pivotal strategy for enriching the educational experience and equipping students for successful careers. If you have specific inquiries or wish to delve into other aspects of this subject, please provide additional details.

The acknowledgment of MBKM's direct influence on Graduate Quality (H5) underscores the imperative of prioritizing and proficiently implementing MBKM. The emphasis lies in affording students greater autonomy to shape their educational trajectories, facilitating exploration of diverse learning experiences that transcend traditional boundaries. This signifies a transition toward a more student-centric, adaptable, and experiential learning approach. The emphasis on the direct impact of MBKM on Graduate Quality highlights the need to prioritize and implement MBKM effectively within the educational framework. The central focus is on empowering students with increased autonomy in sculpting their educational journeys, fostering exploration of varied learning experiences beyond conventional limits.

The concept of adopting a more student-centric, flexible, and experiential learning approach aligns seamlessly with the overarching trend in education, which emphasizes empowering learners with greater control over their educational trajectories. Granting students agency in selecting their courses, fostering exploration of diverse learning experiences, and incorporating flexibility into the learning process collectively contribute to cultivating a more engaged and motivated student community. This educational approach also acknowledges the significance of preparing students not only with specific knowledge and skills but also with the capacity to adapt to a rapidly changing and dynamic world (Mursitama et al., 2022; Pudyanti & Pham, 2023; Sobri et al., 2023). By affording students increased autonomy, educational institutions aim to nurture critical thinking, creativity, and a sense of responsibility for their own learning journey.

The affirmation of H6 and H7, signifying that MBKM acts as a mediator between Research Support and Industry Participation with Graduate Quality, underscores the pivotal role of MBKM as a bridging mechanism. Educational institutions should strategically integrate MBKM into their

frameworks, recognizing it as a dynamic tool through which both research support and industry participation collectively contribute to the overarching objective of producing high-caliber graduates (Hamdan & Basrowi, 2024; Kittie & Basrowi, 2024; Nuryanto et al., 2019). This integration extends beyond the mere implementation of MBKM; it necessitates continuous monitoring and adaptive structuring to optimize its mediating effects. In essence, MBKM is identified as a crucial bridge, connecting support for research activities and collaboration with industries to realize the ultimate goal of fostering high-quality graduates. The recommendation emphasizes the strategic integration of MBKM into educational frameworks, accentuating its role as a mechanism that facilitates the positive impact of both research support and industry participation on graduate quality (Sa'diyah et al., 2022). This comprehensive integration not only involves the initial implementation of MBKM but also requires ongoing monitoring and adaptive adjustments to its structure. By acknowledging MBKM as a central element in the educational process, institutions ensure that students undergo a holistic learning experience that harmonizes rigorous academic training, exposure to cutting-edge research, and practical industry engagement. This integrated approach is designed to produce graduates who are not only academically proficient but also well-rounded, adaptable, and thoroughly equipped to meet the challenges of the professional world.

The managerial implications derived from the endorsement of H1 to H7 underscore the imperative for a comprehensive approach to education in Indonesia. This involves cultivating an environment driven by research, fortifying collaborations between academia and industry, prioritizing the proficient execution of MBKM, and acknowledging MBKM as a pivotal mediator in molding graduate quality. By addressing these dimensions, educational institutions can take proactive measures to foster the creation of graduates who are not only highly skilled but also adaptable, aligning seamlessly with the ever-evolving demands of the global workforce.

## Conclusion

This study offers a nuanced comprehension of the interplay among Research Support, Industry Participation, MBKM, and Graduate Quality within the higher education context of Indonesia. The affirmation of hypotheses H1 to H7 underscores the intricate relationships among these constructs,

providing valuable insights with implications for both theoretical understanding and practical application.

This study's theoretical significance lies in confirming the crucial roles played by Research Support and Industry Participation in shaping MBKM and, consequently, impacting Graduate Quality. The identification of MBKM as a mediator in these relationships extends current theoretical frameworks, highlighting the importance of adopting a holistic perspective in educational models. The contribution of this study to theoretical advancement is evident in its unraveling of the intricate interactions among these key elements. From a practical standpoint, this study provides actionable insights for educational institutions and policymakers. Strengthening research support mechanisms and cultivating strong industry collaborations are identified as pivotal avenues to improve the quality of graduates. The study emphasizes the significance of effectively implementing MBKM, with a focus on a student-centric educational approach, as crucial for preparing graduates to meet the dynamic demands of the workforce. The stakeholders in the education sector are encouraged to translate these practical insights into strategies and policies that can optimize educational experiences and outcomes.

**Limitations and Recommendation**

Although this study offers valuable insights, it has certain limitations. Relying solely on a quantitative approach might not fully capture the nuanced dynamics of the relationships being explored. Furthermore, the generalizability of the study's findings could be constrained to the particular higher education context in Indonesia. To enhance the robustness and applicability of future research, it would be beneficial to incorporate mixed-methods approaches and broaden the diversity of the sample. These adjustments could provide a more comprehensive understanding of the complex interactions at play.

Based on the findings of this study, several recommendations are put forth. Educational institutions are urged to actively strengthen research support structures, foster meaningful industry collaborations, and ensure the effective implementation of MBKM. Ongoing monitoring and adaptation of MBKM are crucial to maximize its mediating effects. Policymakers are encouraged to incorporate these findings into policy formulations, aligning educational strategies with the evolving demands of the workforce. Future research endeavors could delve into longitudinal

impacts, offering a deeper understanding of the nuanced experiences of students and industry partners within the MBKM framework.

In conclusion, this study not only enriches our understanding of the higher education landscape in Indonesia but also lays the foundation for further investigations into the intricate relationships influencing graduate quality. The drawn conclusions, along with theoretical and practical implications, acknowledged limitations, and presented recommendations, collectively offer a comprehensive framework that contributes to shaping the future trajectory of higher education in the Indonesian context.

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## Appendix 1

**Table 1**
*Research Instrument*

| Variable | Source | Item | Indicator |
|---|---|---|---|
| Research Support | (Abdul et al., 2022; Barnard & Van der Merwe, 2016; Haneberg et al., 2022) | RES1 | The university offers state-of-the-art research resources, including well-equipped laboratories, up-to-date software, and an extensive library, to facilitate successful research |
| | | RES2 | The university provides financial support for student and faculty research projects to ensure they have the necessary funding to conduct their research effectively |
| | | RES3 | The university establishes strong partnerships with industry stakeholders, fostering collaborative research projects that address real-world challenges and needs |
| | | RES4 | The university has adequate access to relevant industrial data and information, which is instrumental in shaping and enriching research projects |
| | | RES5 | The university consistently publishes and disseminates research findings, ensuring that the outcomes of research benefit not only academia but also the industry |
| | | RES6 | Students have substantial opportunities to engage in research projects aligned with industry needs, allowing them to apply their academic knowledge in practical settings |
| | | RES7 | The university's collaboration with the industry is accredited by industrial partners as a positive and impactful contribution to research and development |
| Industry Participation | Al Yakin et al. (2023) | IND1 | Industries actively participate in the curriculum design process, providing valuable insights in determining relevant subjects aligned with industry needs |
| | | IND2 | Industry participation within MBKM offers students opportunities to develop practical skills that are relevant to industry demands |

| | | | |
|---|---|---|---|
| | | IND3 | Industry involvement within MBKM opens doors for students to secure job opportunities that match their educational background |
| | | IND4 | The curriculum at the university is highly relevant to the needs and demands of the industry, ensuring graduates possess the necessary knowledge |
| | | IND5 | The integration of research elements into the curriculum enables students to gain in-depth understanding of industry-relevant issues |
| | | IND6 | Graduates exhibit excellent abilities to meet industry needs and expectations within their job roles |
| | | IND7 | Active industry engagement within MBKM has a positive impact on the development of higher education programs, ensuring their relevance in the job market |
| MBKM | (Dian et al., 2023; Simarmata & Mayuni, 2023; Wulandari et al., 2023) | MBKM1 | Students have the autonomy to design their own curriculum, select elective courses, and actively participate in shaping their educational journey |
| | | MBKM2 | Industries actively collaborate in curriculum development, providing insights and expertise that align with current workforce needs |
| | | MBKM3 | The curriculum is regularly updated to ensure that it remains aligned with the dynamic demands of the industry and relevant to students' career aspirations |
| | | MBKM4 | Students acquire practical skills and competencies, including communication, problem-solving, and teamwork, which are vital for their future careers |
| | | MBKM5 | MBKM graduates exhibit high-quality qualifications and practical skills that match the expectations of potential employers |
| | | MBKM6 | Research conducted within the MBKM framework contributes to academic knowledge and is disseminated through reputable publications and conferences |
| | | MBKM7 | Institutions implementing MBKM effectively receive accolades and recognition for their |

| | | | |
|---|---|---|---|
| | | | commitment to innovative education and industry collaboration |
| | | MBKM8 | Students perceive MBKM as a flexible platform that empowers them to pursue their academic and career goals |
| | | MBKM9 | Industries recognize the caliber of MBKM graduates and their readiness to contribute to the workforce, resulting in positive industry feedback |
| | | MBKN10 | MBKM alumni frequently secure positions of leadership and influence in their respective industries |
| Graduate Quality | (Mursitama et al., 2022; Pudyanti & Pham, 2023; Rotty et al., 2022; Sobri et al., 2023) | GQUAL1 | Graduates can apply theoretical knowledge in practical situations and effectively solve workplace related problems |
| | | GQUAL2 | The knowledge possessed by graduates is highly relevant to industry demands and meets employer expectations |
| | | GQUAL3 | Graduates are ready to actively engage in work, possessing the necessary skills for success in their careers |
| | | GQUAL4 | Employers provide positive feedback on the quality and contributions of graduates in the workplace |
| | | GQUAL5 | MBKM graduates consistently achieve significant career advancement shortly after graduation |
| | | GQUAL6 | Employers are satisfied with the quality of graduates they recruit from the MBKM program |
| | | GQUAL7 | Graduates can adapt to changes in the work environment and continuously develop themselves to remain relevant |
| | | GQUAL8 | Graduates perform with high job performance, achieving targets, and making meaningful contributions in the workplace |
| | | GQUAL9 | Graduate qualifications are highly relevant to job specifications in the labor market |
| | | GQUAL10 | The majority of graduates successfully find jobs related to their field of study shortly after graduation |

**Appendix 2**
*Confirmatory Factor Analysis*

| Construct | Items | Outer Loading | Cronbach's Alpha | rho_A | CR | AVE |
|---|---|---|---|---|---|---|
| Research Support | RES1 | 0.922 | 0.976 | 0.976 | 0.98 | 0.872 |
| | RES2 | 0.939 | | | | |
| | RES3 | 0.942 | | | | |
| | RES4 | 0.937 | | | | |
| | RES5 | 0.928 | | | | |
| | RES6 | 0.944 | | | | |
| | RES7 | 0.925 | | | | |
| Industry Participation | IND1 | 0.864 | 0.971 | 0.978 | 0.976 | 0.853 |
| | IND2 | 0.934 | | | | |
| | IND3 | 0.940 | | | | |
| | IND4 | 0.915 | | | | |
| | IND5 | 0.958 | | | | |
| | IND6 | 0.903 | | | | |
| | IND7 | 0.948 | | | | |
| MBKM | MBKM1 | 0.850 | 0.973 | 0.975 | 0.976 | 0.803 |
| | MBKM10 | 0.883 | | | | |
| | MBKM2 | 0.892 | | | | |
| | MBKM3 | 0.940 | | | | |
| | MBKM4 | 0.910 | | | | |
| | MBKM5 | 0.922 | | | | |
| | MBKM6 | 0.879 | | | | |
| | MBKM7 | 0.901 | | | | |
| | MBKM8 | 0.908 | | | | |
| | MBKM9 | 0.870 | | | | |
| Graduate Quality | GQUAL1 | 0.899 | 0.960 | 0.962 | 0.966 | 0.738 |
| | GQUAL10 | 0.890 | | | | |
| | GQUAL2 | 0.868 | | | | |
| | GQUAL3 | 0.919 | | | | |
| | GQUAL4 | 0.872 | | | | |
| | GQUAL5 | 0.750 | | | | |
| | GQUAL6 | 0.898 | | | | |
| | GQUAL7 | 0.883 | | | | |
| | GQUAL8 | 0.859 | | | | |
| | GQUAL9 | 0.730 | | | | |