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Research Article

What Are the Determinants of Employability for Vocational Graduates in Jakarta: The Role of Curriculum, Internships, Family Support, and Women's Gender Perspectives?

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Abstract

This study explores the factors influencing employability for vocational higher education graduates in Jakarta, focusing on industry-based curriculum, internships, family support, and gender. Using a quantitative approach, Partial Least Squares Structural Equation Modeling (PLS-SEM) and Necessary Condition Analysis (NCA) were employed to analyze the relationships between these variables. Data were gathered through a survey of vocational graduates using purposive sampling. Results show that industry-based curriculum, internship experience, educational infrastructure, campus environment, and family support significantly contribute to employability. The study emphasizes the importance of integrating industry practices into education and providing strong family support, especially for women. This research presents a novel model that combines these factors, offering insights for improving vocational education and supporting female graduates in a competitive labor market. Strategies such as strengthening the curriculum, enhancing internship programs, and ensuring gender-sensitive support structures are essential for improving employability. This study contributes to employability literature by providing a comprehensive framework that can guide educational reforms, particularly focusing on gender equality and practical experience.

Keywords: Graduate Employability; Vocational Education; Industry-Based Curriculum; Internship Program; Gender Equality.

INTRODUCTION

Graduate employability is a critical indicator in assessing the effectiveness of higher education systems, as universities are expected to produce graduates who possess not only academic knowledge but also professional skills that align with the demands of the labor market. Despite this expectation, significant gaps remain between the competencies of graduates and the needs of the industry, often referred to as the skills mismatch phenomenon. This gap indicates that higher education systems are not fully capable of producing graduates who are adequately prepared to enter the workforce [1], [2], [3].

The transformation of the global economic structure and the rapid advancement of digital technologies have heightened the demand for a workforce that is adaptive, innovative, and multidisciplinary, capable of contributing to the growth of a knowledge-based economy [4], [5], [6]. In this context, employability is understood as the combination of skills, knowledge, and personal attributes that enable graduates to secure, retain, and progress in their professional careers sustainably [7], [8], [9]. This skills mismatch phenomenon suggests the need for higher education strategies that integrate industry needs into the learning process, ensuring that graduates acquire skills that are relevant to the job market [10], [11].

In vocational higher education, the development of employability is the primary goal, as vocational education is designed to prepare a workforce equipped with practical skills and professional competencies aligned with industry requirements. Vocational education emphasizes the integration of theoretical learning with industrial practice, providing students with more applicable and contextual learning experiences . Previous research has shown that the employability of graduates is influenced by various multidimensional factors involving academic, institutional, social, and work experience aspects that students acquire during their studies [12], [13], [14].

In addition to the academic and institutional factors, the role of gender in employability must also be considered. While the participation of women in higher education has increased, they still face challenges entering the labor market, especially in fields traditionally dominated by men, such as technology and certain industries. Family support, including from parents, as well as industry-based curricula that are responsive to the needs of women, can play a significant role in enhancing female employability. Research has shown that women who receive strong family support and are involved in relevant internship experiences have a higher likelihood of career success [15], [16], [17].

This study aims to analyze the determinant model of employability for vocational higher education graduates in Jakarta by integrating seven key variables: the role of parents, industry-based curriculum, practitioner lecturers, infrastructure, education costs, campus environment, and internship experience. Using a quantitative approach with Partial Least Squares Structural Equation Modeling (PLS-SEM) and Necessary Condition Analysis (NCA), the study explores the causal relationships between these factors and the minimum conditions necessary to increase graduate employability. This research is expected to make a theoretical contribution to the employability literature and provide policy recommendations for vocational education managers to enhance the quality of graduates ready to enter the workforce [18], [19].

Additionally, this study aims to enrich the discourse on gender equality in enhancing employability within vocational education, particularly in Indonesia, by addressing the unique

challenges that women face in entering a competitive labor market. Through a better understanding of the factors that influence employability, this research is expected to offer new insights that can be applied by vocational institutions to design more effective and inclusive curricula and educational strategies.

METHODS

Research Design

This study employed a quantitative cross-sectional design utilizing the Partial Least Squares Structural Equation Modeling (PLS-SEM) and Necessary Condition Analysis (NCA) methods. PLS-SEM was selected for its robust capability to simultaneously test complex causal relationships involving multiple latent constructs and indicators, providing high predictive accuracy in educational and management research [20], [21], [22], [23]. While PLS-SEM operates on a sufficiency logic to evaluate direct and indirect effects, NCA was integrated as a complementary approach to identify the minimum necessary conditions required for an outcome to occur [24], [25], [26]. By combining these two analytical approaches, the research design ensures a comprehensive evaluation of the multidimensional determinants shaping the employability of maritime vocational education graduates.

Participants and Data Collection

The target population comprised more than 200 graduates from maritime vocational higher education institutions who are currently transitioning into the global maritime labor market [27], [28], [29]. Through a purposive sampling technique, a total of 150 graduates were selected as the final sample. The participants specifically consisted of graduates from the Nautical and Engineering departments who had completed their education within the last five years and had undertaken formal internship programs during their study period [28], [29]. Data collection was systematically conducted over a defined period from August 2025 to February 2, 2026. This sample size of 150 respondents fulfills the technical requirements for PLS-SEM analysis because it exceeds the minimum threshold of ten times the largest number of structural paths directed at a particular construct in the research model [23], [30].

Instrument

Primary data were collected through structured interviews based on a comprehensive research questionnaire. Utilizing structured interviews for quantitative data collection allowed researchers to obtain more accurate responses through direct clarification with participants while maintaining the objectivity of the instrument [30], [31]. The instrument was specifically designed to measure the seven exogenous variables alongside the endogenous variable of graduate employability. Participant responses were recorded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which serves as a validated measurement standard for quantifying attitudes and perceptions in the social sciences [30].

Data Analysis Procedure

The analytical procedure was executed using the SmartPLS software. The evaluation process was divided into two primary stages, specifically the measurement model (outer model) and

the structural model (inner model) [30]. The measurement model evaluation assessed convergent validity through factor loadings and the Average Variance Extracted (AVE), as well as internal consistency reliability using Composite Reliability and Cronbach's Alpha. Discriminant validity was rigorously verified utilizing the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT) [23], [32]. Following the successful validation of the measurement model, the structural model was evaluated to determine the significance of the path coefficients through a bootstrapping procedure to obtain t-statistics and p-values. Furthermore, the explanatory power and predictive relevance of the model were assessed using the coefficient of determination and Q-square values [30]. Concurrently, the NCA was conducted to calculate the effect size and perform bottleneck analyses. This step aimed to determine the minimum thresholds of each independent variable required to achieve optimal levels of graduate employability [24], [33].

RESULTS AND DISCUSSION

Results

Descriptive Statistics Respondents

Descriptive statistics are used to provide an overview of the characteristics of respondents who are the research sample so as to help researchers understand the distribution of data before further analysis [34]. Descriptive statistical analysis typically includes respondent demographic information such as gender, age, program of study, internship experience, and employment status after graduation to describe the characteristics of the study population [35], [36].

In addition to demographic characteristics, descriptive statistics are also used to display the mean values, standard deviations, minimums, and maximums of each research indicator to determine the tendency of respondents' responses [37]. Descriptive statistical analysis is an important first step because it helps ensure the quality of data before structural model testing in SEM-based research [38].

Measurement Model Evaluation (Outer Model)

The evaluation of the measurement model is a critical initial stage to ensure that the indicators utilized in the study possess adequate validity and reliability in representing the latent constructs [8], [10]. In PLS-SEM, the outer model defines the relationship between the observable indicators and their respective latent variables [8], [9]. To assess this, an outer loading analysis was conducted. Outer loading values indicate the strength of the relationship between an indicator and its latent construct. Typically, an outer loading value above 0.70 demonstrates robust indicator reliability, signifying that the construct explains a substantial portion of the indicator's variance [8], [23].

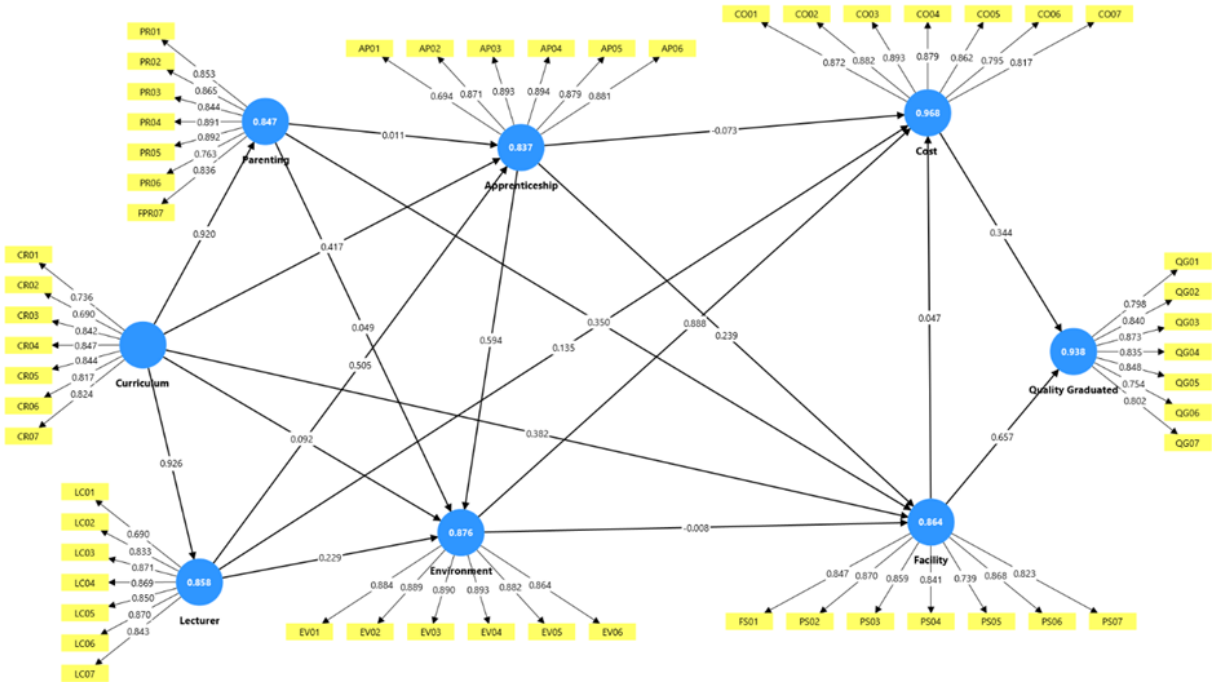

Figure 1. PLS-SEM Measurement Model Diagram

Table 1. Outer Loading Results for Measurement Model Validation

Outer Indicator	Loading Value	Remark	Outer Indicator	Loading Value	Remark
Outer Indicator	0.894	VALID	LC01 Lecturer	0.89	VALID
AP01 - Apprenticeship	0.871	VALID	LC02 Lecturer	0.833	VALID
AP02 - Apprenticeship	0.893	VALID	LC03 Lecturer	0.871	VALID
AP03 - Apprenticeship	0.894	VALID	LC04 Lecturer	0.869	VALID
AP04 - Apprenticeship	0.879	VALID	LC05 Lecturer	0.85	VALID
AP05 - Apprenticeship	0.881	VALID	LC06 Lecturer	0.87	VALID
AP06 - Apprenticeship	0.872	VALID	LC07 Lecturer	0.843	VALID
CO01 - Cost	0.882	VALID	PR01 Parenting	0.853	VALID

Outer Indicator	Loading Value	Remark	Outer Indicator	Loading Value	Remark
CO02 - Cost	0.893	VALID	PR02 Parenting	0.865	VALID
CO03 - Cost	0.879	VALID	PR03 Parenting	0.844	VALID
CO04 - Cost	0.862	VALID	PR04 Parenting	0.891	VALID
CO05 - Cost	0.795	VALID	PR05 Parenting	0.892	VALID
CO06 - Cost	0.817	VALID	PR06 Parenting	0.763	VALID
CO07 - Cost	0.736	VALID	PR07 Parenting	0.836	VALID
CR01 - Curriculum	0.89	VALID	FS01 - Facility	0.847	VALID
CR02 - Curriculum	0.842	VALID	FS02 - Facility	0.87	VALID
CR03 - Curriculum	0.847	VALID	FS03 - Facility	0.859	VALID
CR04 - Curriculum	0.844	VALID	FS04 - Facility	0.841	VALID
CR05 - Curriculum	0.817	VALID	FS05 - Facility	0.739	VALID
CR06 - Curriculum	0.824	VALID	FS06 - Facility	0.848	VALID
CR07 - Curriculum	0.884	VALID	FS07 - Facility	0.823	VALID
EV01 - Environment	0.889	VALID	QG01 - Quality Graduated	0.79	VALID
EV02 - Environment	0.89	VALID	QG02 - Quality Graduated	0.84	VALID

Outer Indicator	Loading Value	Remark	Outer Indicator	Loading Value	Remark
EV03 - Environment	0.893	VALID	QG03 - Quality Graduated	0.873	VALID
EV04 - Environment	0.882	VALID	QG04 - Quality Graduated	0.835	VALID
EV05 - Environment	0.864	VALID	QG05 - Quality Graduated	0.848	VALID
			QG06 - Quality Graduated	0.754	VALID
			QG07 - Quality Graduated	0.802	VALID

As presented in Table 1, all indicators yielded outer loading values well above the recommended minimum threshold. This confirms that all items are valid in measuring their respective research constructs. The variables representing parenting, curriculum, lecturer quality, learning environment, and educational facilities are capable of consistently describing the underlying theoretical concepts [10], [23]. Establishing this adequate validity is a mandatory prerequisite before proceeding to the structural model analysis, ensuring that the interpretations of relationships are based on highly reliable measurements [8].

Structural Model Evaluation (Inner Model) and Hypotheses Testing

Following the measurement model validation, a structural model evaluation was performed to test the causal relationships between the constructs. This evaluation utilizes a non-parametric bootstrapping procedure to generate an empirical sampling distribution, calculating the t-statistics and p-values for every path in the model [30], [39], [40].

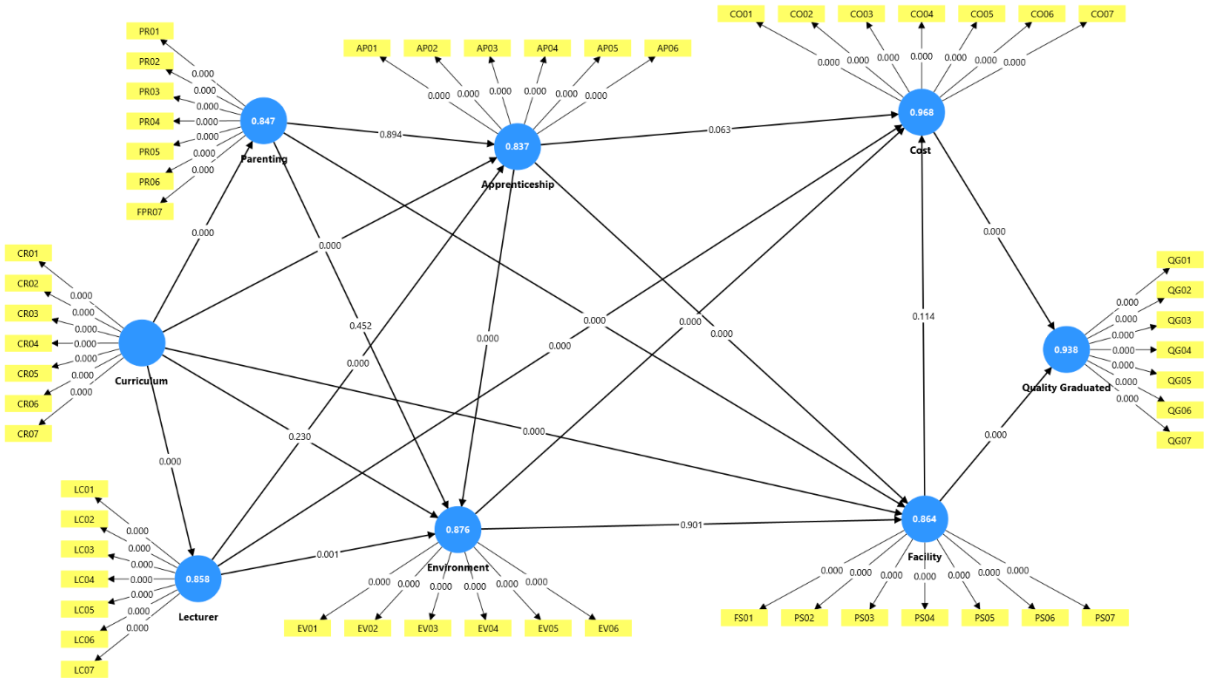

Figure 2. PLS-SEM Bootstrapping Results Diagram

The bootstrapping results revealed that the majority of the relationships between the exogenous variables and graduate employability possess a p-value of 0.000, indicating robust statistical significance at the 5% level [30], [41]. In PLS-SEM, interpreting the path coefficients illustrates how changes in the exogenous variables proportionally affect the endogenous variable while accounting for simultaneous construct interactions [28], [30].

The findings confirm that academic variables, specifically industrial curriculum and practitioner lecturers, significantly drive graduate competence. A curriculum aligned with learning outcomes, combined with effective teaching methods delivered by experienced practitioners, directly enhances student success in achieving professional maritime competencies [19], [20]. Furthermore, institutional support variables such as learning environments, educational facilities, and cost investments strongly dictate the quality of the learning experience [21], [22]. Apprenticeship programs also emerged as a critical driver, proving that practical work experience prepares students comprehensively for post-graduation employment [8], [23]. Beyond institutional boundaries, the parenting variable showed a significant impact, reflecting the crucial role of family emotional and financial support in shaping academic readiness and character development [17], [18].

Necessary Condition Analysis (NCA)

While PLS-SEM identifies causal factors that are sufficient for achieving an outcome, NCA was utilized to identify variables that act as mandatory minimum requirements for graduate employability [13], [14]. NCA operates on the logic of necessity, positing that if a specific condition is not met, the desired outcome cannot occur regardless of the presence of other supporting factors [12], [29].

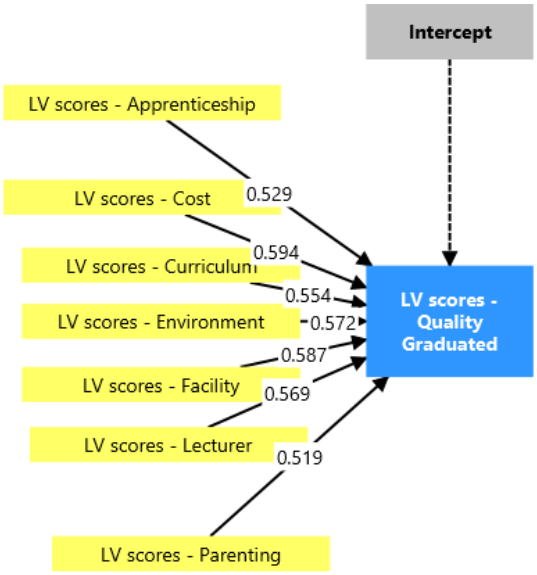

Figure 3. Necessary Condition Analysis Plot

The analysis utilized a latent variable scores approach to evaluate the relative contribution of each construct to the achievement of specific outcomes [8], [23]. The findings revealed that all seven variables possess high correlation coefficients concerning the quality of graduates, with the highest scores attributed to cost (0.594), environment (0.587), parenting (0.572), and facility (0.569). To pinpoint the exact minimum thresholds, a bottleneck analysis was conducted.

Table 2. Minimum NCA Results for Graduate Employability

Target Quality Level	LV Apprentices-hip	LV Cost	LV Curriculum	LV Environment	LV Facility	LV Lecturer	LV Parenting
0.00%	NN	NN	NN	NN	NN	NN	NN
10.00%	1.137	1.429	1.851	1.168	1.705	1.706	1.307
20.00%	1.137	1.429	1.851	1.168	1.705	1.706	1.307
30.00%	3.526	3.856	3.45	3.834	3.714	3.6	3.447
40.00%	3.526	3.856	3.45	3.834	3.714	3.6	3.447
50.00%	3.526	3.856	3.45	3.834	3.714	3.6	3.447
60.00%	3.526	3.856	3.45	3.834	3.714	3.6	3.447
70.00%	3.526	3.856	3.45	3.834	3.714	3.6	3.447
80.00%	3.863	4	3.764	4	4	3.901	3.889
90.00%	4.35	4.428	4.206	4.336	4.293	4.24	4.164

Target Quality Level	LV Apprentices-hip	LV Cost	LV Curriculum	LV Environment	LV Facility	LV Lecturer	LV Parenting
100.00%	4.7	4.855	4.599	4.832	4.576	4.593	4.449

As indicated in Table 2, the bottleneck analysis provides strategic insight into educational improvement priorities by outlining the minimum conditions required [29], [30]. The data illustrate a clear progression: higher targets for graduate quality demand strictly higher minimum levels across all educational ecosystem variables. Achieving a 100% quality target necessitates exceedingly high baseline thresholds in educational cost investment (4.855) and learning environment quality (4.832). This confirms that generating highly competent maritime graduates requires the unwavering support of a comprehensive education system [21], [22].

Gender Considerations in Graduate Employability

The findings of this study underscore the multidimensional factors that contribute to the employability of vocational higher education graduates. While the focus has been on key institutional and environmental determinants such as curriculum design, infrastructure, and internship opportunities, it is crucial to also address gender dynamics, particularly concerning women's employability in the labor market. Globally, women continue to face significant challenges in securing employment, especially in male-dominated industries such as engineering, technology, and manufacturing. These challenges are further exacerbated in developing countries, where traditional gender roles can restrict women's access to career opportunities, professional networks, and even the relevant educational experiences that enhance employability [42], [43], [44]. In the context of vocational education, the integration of gender-sensitive curricula and the encouragement of female participation in internships are essential for addressing these disparities.

The role of family support, as identified in this study, has a particular resonance for female graduates. Parental involvement not only provides emotional support but also plays a pivotal role in shaping career aspirations and boosting confidence. For many women, strong familial backing can bridge the gap between education and the workforce, empowering them to pursue careers that might otherwise seem unattainable. However, this dynamic is more pronounced when family support actively encourages career development, especially in fields traditionally dominated by men [45], [46], [47]. Additionally, the involvement of practitioner lecturers, particularly those who are women and bring industry experience, can serve as powerful role models. Female practitioners can offer unique insights into navigating gender-related challenges within the workforce, thus providing women students with a clearer pathway into their professional careers [48], [49], [50]. The curriculum itself should also reflect the growing demand for women in leadership roles across industries, ensuring that female students not only receive the technical skills needed but also develop the confidence and soft skills required to thrive in diverse work environments.

Thus, while this study highlights the importance of integrating various educational and institutional factors, it is crucial to recognize the specific barriers that women face in achieving employment. Policy recommendations derived from this research must consider the necessity of creating an inclusive, gender-sensitive educational framework that addresses these barriers and fosters an environment where female graduates can succeed equally in their respective industries.

Discussion

The findings of this study provide significant insights into the determinants of graduate employability in vocational higher education, particularly in the context of Jakarta. The results highlight the importance of factors such as industry-based curriculum, internship experiences, educational infrastructure, campus environment, and family support, which align with previous studies that emphasize the integration of academic knowledge with industry practices. These findings corroborate the work of Akhtar et al. [51], who argue that a curriculum closely aligned with industry needs enhances graduates' job readiness by providing them with relevant skills and competencies. The role of internships, as demonstrated in this study, further supports the argument that practical work experiences allow students to develop critical soft skills such as communication, teamwork, and adaptability, which are essential for success in the workforce [52], [53].

Additionally, the study's findings on the significant impact of family support on employability align with research by Cheung [54] and Dodd et al. [55], which emphasize that parental encouragement and career guidance can significantly influence a student's career readiness and job search behavior. This study, however, adds a novel dimension by integrating family support into a comprehensive conceptual model that also includes institutional and industrial factors, presenting a holistic view of the employability determinants for vocational graduates. Moreover, the inclusion of practitioner lecturers as a key variable underscores the value of bridging the gap between theoretical learning and real-world application, which is essential for vocational education [6], [56], [57].

The discussion on gender considerations, particularly for women, presents an important extension to the literature on employability. While previous studies often overlook the gender-specific challenges women face in accessing employment, this study highlights how family support and the presence of female practitioner lecturers can provide women with the necessary confidence and guidance to succeed in male-dominated industries. The research also emphasizes the importance of gender-sensitive curricula that can empower women to pursue careers in fields where they have traditionally been underrepresented [58], [59]. By integrating these gendered perspectives, the study provides new insights into how vocational education systems can better support female graduates in achieving higher employability.

The novelty of this study lies in its comprehensive approach to employability, integrating seven distinct but interconnected variables family support, industry-based curriculum, practitioner lecturers, educational infrastructure, campus environment, tuition fees, and internships into a single conceptual model. This holistic model allows for a deeper understanding of the complex interplay between academic, institutional, and social factors that influence employability, filling a gap in existing research where these factors have often been studied in isolation [60], [61], [62]. Furthermore, the use of PLS-SEM and NCA allows for a

robust analysis of causal relationships and minimum conditions necessary to enhance employability, providing both theoretical and practical contributions to the field.

The implications of this study are far-reaching for both policymakers and educators in vocational higher education. For policymakers, the findings suggest that there is a need to strengthen the link between education and industry by reforming curricula to reflect the evolving demands of the labor market, improving internship programs, and ensuring that educational institutions provide the necessary infrastructure for practical learning. The study also underscores the importance of supporting female students, not only through curricula but also through mentoring and industry connections that can help them navigate gender-specific challenges. For educators, the findings encourage the integration of real-world industry practices into teaching and the involvement of practitioner lecturers who can offer invaluable insights and mentoring to students. This study makes an important contribution to the literature on graduate employability by providing a comprehensive, multidimensional model that integrates various institutional, academic, and social factors. The focus on gender, particularly the barriers women face in entering the workforce, adds a novel dimension to the employability discourse, making the findings particularly relevant in today's context of increasing calls for gender equality in the workplace. This research not only advances theoretical understanding but also offers practical insights for enhancing the employability of vocational graduates, ensuring they are better prepared to meet the challenges of a dynamic and competitive labor market.

CONCLUSION

This study provides a comprehensive model for understanding the key determinants of employability among vocational higher education graduates in Jakarta, highlighting the critical roles of industry-based curricula, internship experiences, educational infrastructure, family support, and gender-sensitive strategies in enhancing graduate employability. The findings underscore the need for a holistic approach to vocational education that integrates academic learning with practical industry experience while also addressing the unique challenges faced by female graduates in the labor market. By incorporating these multifaceted elements into a single conceptual framework, the study contributes valuable insights to both the academic literature and practical policymaking. The results advocate for the strengthening of curricula, the enhancement of internship programs, and the provision of targeted support for female students, all of which are essential for preparing graduates to succeed in an increasingly competitive and dynamic job market.

LIMITATIONS

While this study provides valuable insights into the factors influencing graduate employability in vocational education, there are several limitations that should be considered. First, the research was conducted within a specific geographic context Jakarta limiting the generalizability of the findings to other regions with different educational systems or labor market conditions. Second, the study relied on self-reported data from graduates, which may introduce response bias, particularly regarding perceptions of employability and family support. Additionally, the cross-sectional design of the study provides a snapshot of

employability factors at a single point in time, limiting the ability to track long-term outcomes or observe changes over the course of a graduate's career. Lastly, while the study integrated various factors influencing employability, it did not account for potential variations in outcomes based on specific industries or occupations, which could provide a more nuanced understanding of how these factors interact in different professional contexts. Future research could address these limitations by expanding the study to different regions, using longitudinal data, and incorporating industry-specific variables to further enrich the findings.

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CONFLICT OF INTEREST

"The authors declare no conflict of interest."

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used ChatGPT during the preparation of this work to design graphics and images. After utilizing the tool, the authors thoroughly reviewed and edited the content as necessary, assuming full responsibility for the publication's content.

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