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Strategies for Tracing Vocational Training Graduates: Integrating Technology and Industry Needs to Address Labor Market Challenges

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Abstract: The Competency-Based Training (CBT) program faces several challenges, one of which is its alignment with the needs of the industrial sector. Tracing vocational training graduates is a key factor in measuring the success of training programs and ensuring their relevance to industry demands. This study aims to provide recommendations for effective graduate tracing strategies that can be implemented by vocational training providers. The research employs a mixed-method approach with a descriptive framework, using SWOT analysis and data triangulation techniques. The findings reveal that one of the strengths of graduate tracing at Vocational Training Centers (VTCs) is the high use of social media for interaction among graduates, reported by 89.2% of respondents. On the other hand, a notable weakness is the lack of consistency in implementation, as indicated by 48.1% of VTCs not having a regular schedule for tracking graduates. Changes in labor market demands, increasingly focused on technology-based skills and digitalization, provide opportunities for training providers to adapt their curricula to better align with industry developments. Most BLKs, however, only have 1-2 staff members responsible for graduate tracing, posing a significant challenge. Strategies derived from the Strength-Opportunity quadrant focus on leveraging technology to enhance tracing effectiveness and fostering stronger collaborations with industry. Meanwhile, strategies from the Weakness-Opportunity quadrant emphasize optimizing available resources and enhancing human resource capacity.

Keywords: Strategy, Tracing, Alumni, Vocational Training

Introduction

Vocational training is a crucial pillar in improving the quality of Indonesia's human resources (Abdillah, F., 2024). In accordance with Government Regulation No. 31 of 2006, vocational training is designed to equip individuals with the skills and competencies needed in the labor market. It has been recognized as one of the key drivers of economic development, particularly in addressing unemployment and enhancing workforce competitiveness (Audiva, S. F., 2023; Harini, H., et al., 2024). High-quality vocational training programs can improve workforce skills, which in turn boosts productivity and economic growth (Avana, N., et al., 2024; Effendi, M. I., et al., 2024).

With technological advancements, vocational training has adapted by incorporating digital technology into its teaching methods (Sassi, K., 2024). According to Deitmer et al.

(2012), the use of technology in vocational training not only increases the efficiency of training but also enables the development of deeper and more industry-relevant skills. With flexible durations and customizable curricula, vocational training also serves as an effective solution to bridge the gap between industry needs and workforce capabilities (Raihansyah, M. Z., et al., 2024; Wardina, U. V., et al., 2019).

Through Competency-Based Training (CBT) programs, participants acquire specific skills relevant to the job market, thereby improving their chances of securing employment or starting a business (Alfaritdzi, R. M., & Prathama, A., 2023; Saputra, I. A., & Denmar, D., 2024). Despite various challenges related to infrastructure, the quality of instructors, and alignment with industry demands, the government continues to strive to enhance the quality of vocational training through various initiatives and policies (Iskandar, A. G., 2022; Utomo, W., 2021).

Tracing vocational training graduates is key to measuring the success of training programs and ensuring alignment with industry needs (Bangga, A., 2022). Data obtained from graduate tracing can be used to evaluate curriculum effectiveness, identify unmet training needs, and improve future training programs (Prasetyo et al., 2022). A more systematic and comprehensive approach is needed for graduate tracing to ensure that the data collected is reliable and useful for improving vocational training quality (Anis, Y., et al., 2024; Pangestika, M. M., et al., 2024).

This study aims to provide recommendations for effective graduate tracing strategies that can be implemented by vocational training providers. These strategies are designed to optimize graduate tracing activities, ensuring they are carried out more effectively, efficiently, and maximally in collecting graduate placement data.

Methodology

This study employs a mixed-method approach (quantitative and qualitative) with a descriptive framework. The data analysis techniques used are SWOT analysis and data triangulation. SWOT analysis is utilized to evaluate internal aspects (strengths and weaknesses) as well as external aspects (opportunities and threats) of graduate tracing activities (Djemma, S. A., et al., 2024).

SWOT analysis is a strategic analysis framework used to identify and evaluate an organization's Strengths, Weaknesses, Opportunities, and Threats (Mahfud, M. H., 2019). This analysis helps in understanding the internal and external factors influencing performance and in designing appropriate strategies (Hidayat, R., et al., 2024). The data collection techniques employed in this research are questionnaires and documentation:

1. Questionnaire: Distributed to graduates and vocational training center (BLK) managers to evaluate existing or previously unaddressed graduate tracing activities. The distribution and collection of questionnaires from vocational training providers will be conducted by Ministry of Manpower, through official correspondence.
2. Documentation: Analysis of data from graduate tracing reports conducted by training providers and institutions/organizations that organize educational and training activities.

The scope of this study encompasses training activities across Indonesia, including vocational training providers, institutions/organizations that implement education and training activities, and graduates who have completed vocational training. The detailed sample for each research object is as follows:

Vocational Training Providers. The data collection technique employed involves the use of questionnaires. Distribution and collection of the questionnaires will be carried out by Ministry of Manpower, through official correspondence and/or online or offline Focus Group Discussions (FGDs). Vocational training providers, in this case under the Ministry of Manpower, will serve as the sample. The data collection process will focus on the following:

a. Technical Implementation Units (UPTD)
b. Community Vocational Training Centers (BLKK)
c. Private Training Institutions (LPKS)

The sample size for the study will be determined using Slovin's formula.

$$n = \frac{N}{1 + N \times e^2} = \frac{2{,}682}{1 + 2{,}682 \times 0{,}1^2} = 96 \text{ (minimal)}$$

Explanation:
n: required sample size
N: total population
e: margin of error

The research population consists of 2,682 BLK, and the sample size determined using the Slovin formula is 96. This sample size is considered the minimum; meaning that in practice, the researcher can aim to collect more than 96 samples. The larger the sample size, the better, as it will more accurately represent the population. Increasing the sample size enhances the reliability and validity of the findings, as a larger sample provides a more comprehensive view of the characteristics and trends within the entire population. Details of the sample for each UPTD, BLKK, and LPKS are as follows:

Table 1. Total Population, Sample Proportion, and Sample Size

Organizational Unit	Amount	Sample Proportion (%)	Amounts of Samples
UPTD	255	9.5	9
BLKK	2,135	79.6	76
LPKS	292	10.9	11
Total	2,682	100	96

Source: Research Data 2024 (processed)

Graduates Who Have Completed Vocational Training. The exact number of graduates who have completed vocational training is unknown (unlimited population).

According to Suyoto in Novianti R., (2024), if the population is unknown, the sample size is calculated using the formula for an infinite population as follows:

$$n = \frac{Z^2 \times p \times (1-p)}{e^2} = \frac{(1.96)^2 \times 0.5 \times (1-0.1)}{0.1^2} = 172.872 \text{ (dibulatkan 173)}$$

Explanation:

n: required sample size

z: Z-score corresponding to the confidence level (value from the normal distribution)

p: assumed population proportion

e: margin of error

The research population consists of alumni from BLK, with the exact number of alumni unknown. Therefore, to determine the sample size, the researcher used the formula for an unknown population (Lamé sample size formula). Based on this calculation, the sample size is 173. This sample size is considered the minimum, meaning that in practice, the researcher may collect more than 173 samples. The larger the sample, the better, as it will more accurately reflect the characteristics and trends of the population. A larger sample size increases the reliability of the results, providing a more comprehensive understanding of the alumni's status and outcomes.

Institutions/Organizations Conducting Educational and Training Activities**.** Key institutions/organizations conducting educational and training activities that serve as benchmarks for education and training activities in Indonesia include the Vocational School of Universitas Gadjah Mada (UGM), the Vocational School of Universitas Indonesia (UI), and training centers. These institutions/organizations are selected as benchmarks for education and training activities in Indonesia to provide recommendations based on successful programs implemented by these entities.

Results and Discussion

This study uses data obtained through the distribution of questionnaires to two respondent groups: BLK managers and BLK graduates. The questionnaire for BLK managers was designed to gather information about the profile and availability of BLK facilities, as well as their ability to trace graduates. Meanwhile, the questionnaire for graduates aimed to understand the real conditions faced by BLK graduates, including challenges and opportunities after completing their training.

Through the questionnaire distribution, data were successfully collected from 340 BLK managers and 5,344 BLK graduates from across Indonesia. The collected data provide a comprehensive overview of the effectiveness of BLK training programs and their relevance in supporting graduates to enter the workforce.

Based on the data collection techniques using questionnaires and documentation, the following SWOT analysis was formulated:

a. Strengths

One of the key strengths based on the graduate tracing questionnaire conducted at Vocational Training Centers (BLK) is the high adoption rate of Contact Centers by BLKs. Data reveals that 67% of BLKs have an official and active Contact Center. The

questionnaire results also indicate a strong commitment from BLKs in allocating dedicated human resources for graduate tracing activities, with nearly 70% of BLKs having designated staff to monitor graduates' career progress.

In addition, data shows that the majority of BLKs have specific programs for tracking graduates' progress. Most BLKs also maintain a graduate database from their inception and consistently conduct follow-ups with graduates after completing their training. About 65.7% of respondents stated that they had been contacted by a BLK to determine their employment status. Furthermore, the questionnaire results indicate that most BLKs have adopted digital technologies, particularly WhatsApp, in their graduate tracking processes.

Another strength is the widespread adoption of social media platforms for building alumni communities of BLK graduates in Indonesia. Approximately 89.2% of respondents reported using social media to interact with fellow graduates. Data also indicates a high level of awareness among BLK graduates about the importance of graduate tracing activities. Nearly all respondents acknowledged the presence of alumni groups utilizing social media platforms, with 94.9% indicating a very high adoption of technology among BLK graduates.

b. Weaknesses

One of the major weaknesses of the graduate tracing system in BLKs is the lack of consistency in implementation. Data shows that 48.1% of BLKs do not have a regular schedule for tracking graduates. Additionally, a significant weakness faced by BLKs in improving the quality of their graduates is the difficulty in tracking their progress after graduation. Approximately 47.5% (163 BLKs) reported challenges in re-establishing contact with graduates, highlighting a significant gap in the tracking and communication system.

c. Opportunities

Vocational training presents several opportunities to enhance the effectiveness of graduate tracing programs. The changing demands of the labor market, with a growing focus on technology-based skills and digitalization, offer significant potential for training providers to align their curricula with industry developments. One such opportunity lies in collaboration with industries.

Government support, such as the revitalization program for vocational schools (SMKs) and the Pre-Employment Card initiative, also provides opportunities for training providers to expand the scope and quality of their programs. These programs help reach a larger number of participants and provide funding and infrastructure to support professional management of graduate tracing activities. Additionally, advancements in information technology enable the use of digital platforms for tracking graduates, such as online surveys, social media, and mobile applications, simplifying data collection efficiently.

Moreover, integrating data from key identification sources like the National Identity Card (KTP), Employment Social Security (BPJS Ketenagakerjaan), and Tax Identification Number (NPWP) into a single ID system has immense potential to

improve the efficiency of tracking employment outcomes for training participants. This integration can facilitate easier and more accurate detection of employment status, workplace locations, and employers, enhancing graduate tracing efforts and helping institutions plan training programs more aligned with labor market needs.

d. Threats

The graduate tracing system at BLKs also faces various challenges. One major challenge is the difficulty in contacting graduates. Many graduates change their contact numbers or fail to update their information with the BLKs, complicating the tracking process. Another challenge is the limited human resources and budget available in many BLKs. Most BLKs have only 1-2 staff members responsible for graduate tracing, who often have additional responsibilities.

The rapid changes in labor market demands also pose a challenge. BLK training programs often fail to fully align with current industry needs, making it difficult for graduates to compete in the job market. Additionally, the data collected on graduates is often incomplete or inaccurate, reducing the validity of the graduate tracing results. Lastly, a lack of collaboration with industry stakeholders in graduate tracing is another barrier. Not all BLKs have strong networks with companies, making it challenging to obtain information on graduate placements.

Based on the SWOT analysis formulation, the following strategy formulations are outlined:

Table 2. SWOT Quadrant Strategies Formulation

Quadrant	Strategies	Explanation
SO (Strength-Opportunity)	a. Utilization of Technology to Enhance the Effectiveness of Tracing	1. Develop a graduate tracing application that is implemented on a large scale, and establish a timeline for the graduate tracing distribution, such as twice a year, using WhatsApp as the communication platform.
		2. Create a national BLK graduate database based on the data collected from the graduate tracing application.
		3. Implement a policy requiring every BLK participant to provide their National ID (KTP), Tax Identification Number (NPWP), and Employment Social Security (BPJS Ketenagakerjaan) upon registration for tracing purposes.
	b. Strengthen collaboration with industry	1. Establish partnerships with industry to ensure that competency-based training programs are relevant to industry needs, with joint efforts in the learning system, curriculum, and On-the-Job Training (OJT).
WO (Weakness -Opportunity)	a. Optimize the use of available resources	1. Optimize existing resources, such as the Contact Center and graduate database, to increase the frequency of tracing and improve data quality.

Quadrant	Strategies	Explanation
	b. Enhance human resource capacity	1. Provide training for human resources in the field of graduate tracing to enhance skills in collecting and analyzing graduate tracing data.
ST (Strength-Threat)	a. Maintain the relevance of training programs	1. Align the curriculum and training programs with the evolving market demands to improve graduate employability.
	b. Strengthen BLK branding	1. Enhance the image of BLK as a high-quality training institution that is relevant to industry needs, demonstrated by the high employability rate of its graduates.
WT (Weakness-Threat)	a. secure funding	1. Allocate budget for the development of a national graduate tracing application for BLK graduates.
	2. optimize the use of technology.	1. Utilize open-source technology or more affordable solutions to enhance the efficiency of the graduate tracing process.

Source: Research Data 2024 (processed)

Based on the analyzed data, a graduate tracing guideline draft has been formulated, which is expected to contribute significantly to improving the quality of training programs and the relevance of graduates to labor market needs. This guideline draft presents the implementation framework for graduate tracing, aimed at tracking graduates' progress and measuring the success of the training programs. Thus, graduate tracing can serve as a foundation for making improvements and developing training programs that are more aligned with market demands. The diagram of the graduate tracing guideline draft is presented in the following chart:

Table 3. Graduate Tracing Guideline Design Table

Phases	With the Tracer Study Application System	With NPWP, BPJS Employment, and ID card (KTP).
Input	1. Human Resources in Graduate Tracing 2. Commitment of BLK Leadership expressed in the form of a Graduate Tracing Policy, including Periodization 3. Development of Graduate Tracing Items (uniform nationwide)	1. Each participant applying to BLK is required to submit a photocopy of their ID card (KTP), Taxpayer Identification Number (NPWP), and BPJS Employment card. 2. HR staff in charge of participant registration will collect data on ID cards (KTP), NPWP, and BPJS Employment. 3. The Ministry of Manpower should establish a partnership with the Directorate General of Taxes and

Phases	With the Tracer Study Application System	With NPWP, BPJS Employment, and ID card (KTP).
	4. Development of a Graduate Tracing Application System (web-based questionnaire) 5. Pilot Testing of the Graduate Tracing Application (web-based questionnaire)	BPJS Employment to allow access to participant data. 4. Integration of participant data.
Process	1. Distribution of Graduate Tracing survey information through the application via WhatsApp 2. Sending information for completion in the months of June and December 3. Completion of the Graduate Tracing Application by graduates 4. Processing of Graduate Tracing data 5. Presentation of Graduate Tracing data 6. Monitoring and Evaluation of Graduate Tracing	1. Data Search and Collection 2. Data Integration 3. Presenting Employment Status Data
Output	Graduate Tracing Report every six months	Graduate Tracing Report every six months

Source: Research Data 2024 (processed)

Overall, the table above illustrates a graduate tracing system that offers two structured and comprehensive programs. This system allows BLK to monitor the success of its graduates periodically and make necessary improvements to enhance the quality of the training programs. Recommendations for developing the graduate tracing system in future work are formulated as follows:

- **Ministry of Manpower:** The Ministry can collaborate with the Directorate General of Taxes and BPJS Ketenagakerjaan to access participant data, which can be integrated to facilitate the graduate tracing system in future work.
- **UPTP (Technical Implementation Unit):** The implementation of the graduate tracing system in future work requires full support and commitment from the UPTP leadership in the form of policies regarding the routine graduate tracing for UPTP-managed institutions (UPTD, Community BLK, and LPK).
- **UPTP-managed Institutions:** In order to enhance the effectiveness of graduate tracing activities, it is recommended that each UPTP-managed institution designate dedicated human resources responsible for carrying out these activities and disseminating

information related to the completion of the graduate tracing survey through various channels simultaneously. Furthermore, it is essential for these institutions to require all prospective participants to submit photocopies of their ID card (KTP), Taxpayer Identification Number (NPWP), and BPJS Employment cards during registration to facilitate the graduate tracing process through integrated data systems. To ensure smooth integration, UPTP-managed institutions should assign specific HR staff to oversee the integration of KTP, NPWP, and BPJS Employment data with the Tax Office (KPP) and BPJS Ketenagakerjaan to access participant data. Finally, the designated HR staff should compile, record, and process graduate employment data, integrating it with information from the Directorate General of Taxes and BPJS Ketenagakerjaan. This will enable the institution to obtain a more comprehensive understanding of graduates' employment status and produce a detailed report on the results of graduate tracing every six months.

Conclusion

Based on the analysis conducted, several graduate tracing strategies for BLK can be formulated. From the Strength-Opportunity quadrant, the main strategy focuses on utilizing technology to improve the effectiveness of graduate tracing and building stronger cooperation with the industry. Social media platforms such as WhatsApp are highly recommended as a communication tool, as they are widely used by graduates to access information. Furthermore, developing a national database for BLK graduates from the graduate tracing application results is important for recording employment status. A policy requiring BLK participants to provide their KTP, NPWP, and BPJS Employment cards during registration will aid in tracking their employment status before and after training.

On the other hand, strategies from the Weakness-Opportunity quadrant emphasize optimizing available resources and enhancing HR capacity. This can be done by maximizing the use of the Contact Center and graduate databases to improve the frequency and quality of tracing. Additionally, training HR in the field of graduate tracing is necessary to improve skills in collecting and analyzing data. In the Strength-Threat quadrant, maintaining the relevance of training programs and strengthening BLK's branding are also focal points, with curriculum adjustments aligned with market needs. Lastly, the Weakness-Threat quadrant proposes strategies for funding and optimizing technology, including allocating budgets for the development of a national graduate tracing application and using more affordable open-source technology for efficiency in the tracing process.

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