

Strategic Partnership Management In Vocational Training Institutions To Support Industry 5.0 Readiness: A Systematic Literature Review

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ABSTRACT

This study aims to explore and identify how partnership management can support Industry 5.0 readiness in vocational training institutions in Indonesia. The study employs a systematic literature review (SLR) and bibliometric analysis using the PRISMA Protocol as a guide. A dataset of articles from Scopus, PubMed, Crossref, and Google Scholar between 2014 and 2024 was analyzed using Vosviewer software to visualize bibliometric networks. The findings reveal the publication of 59 articles indicating that involving the government, private sector, educational institutions, and non-governmental organizations has been proven to accelerate the workforce transformation process into becoming more flexible and technology-oriented. This partnership aims to enhance the capacity and effectiveness of vocational training institutions in meeting industry market demands and preparing a more adaptive, innovative, and future-ready workforce to support Industry 5.0 readiness. The collaboration ensures that training curricula align with labor market needs, provides modern facilities and equipment, and improves instructor competence through training and certification. The government also plays a role in supporting this partnership through financial and regulatory backing, while continuous evaluation helps ensure that training programs remain relevant and effective.

Keywords : Vocational Training, Strategy, Partnership, Management, Industry 5.0

INTRODUCTION

The issue of workforce quality requires multidimensional handling and solutions, positioning labor as a critical factor in the context of globalization, amidst the free markets of AFTA, APEC, and WTO, as well as the demands for zero mistakes and high quality. The government's task of improving the quality of the labor force's human resources is full of challenges, with many remaining pessimistic. One indicator is the still-high unemployment rate year after year. The Open Unemployment Rate (TPT) in Indonesia in February 2024 reached 4.82%, down from 5.45% in February 2023 (Behera et al., 2023; Muhyiddin et al., 2024). Thus, efforts to improve human resource development are needed, one of which is through vocational training to prepare a more adaptive, innovative, and future-ready workforce ('Alam et al., 2024; Eichhorst et al., 2013; Tran, 2013). Given that education and training are mandatory, the Indonesian government provides facilities to implement these programs (Romlah et al., 2023).

Global industrial development has undergone significant changes with the emergence of the Industry 5.0 era, which emphasizes collaboration between humans and advanced technologies such as artificial

intelligence, robotics, and big data (E et al., 2022; Mourtzis et al., 2022). Unlike Industry 4.0, which focuses on automation and digitization, Industry 5.0 highlights the importance of personalization, innovation, and human values in the production process and the use of technology (Grabowska et al., 2022). This shift demands fundamental transformations across various sectors, including workforce readiness, which must adapt to the future industry's needs (Li, 2022). Industry 5.0 requires society to live in an era where advanced technology is present in every aspect of life (Oladejo et al., 2022).

Vocational training institutions play a crucial role in preparing a workforce aligned with the demands of Industry 5.0 (Oeij et al., 2024). However, these institutions often face challenges in aligning their curricula with the latest technological developments, resource limitations, and limited access to current industrial practices. To address these challenges, strategic partnership management is needed between vocational training institutions and various stakeholders, such as technology companies, the government, and educational institutions. Graduates of these training institutions can benefit from such collaborations, ensuring equal access to education opportunities (Lutfi Ariefianto et al 2023). This partnership is expected to enhance the capacity of vocational training institutions to provide training relevant to modern industry needs (Remington, 2018).

Additionally, strategic partnership management is a key element that enables vocational training institutions to update their training programs according to technological developments, access broader resources, and create a flexible, innovative, and technology-oriented workforce (Sung, S. Y., & Choi, 2019). Therefore, research on strategic partnership management in vocational training institutions is highly relevant, especially in preparing the workforce for the Industry 5.0 era. Strategic partnerships can include collaborations with the industrial sector, educational institutions, government, and non-governmental organizations (Geoff Wescott, 2002). Through these partnerships, training institutions can access more extensive resources, including technology, expertise, and funding needed to improve the quality and effectiveness of training programs. Effective strategic partnerships can enhance the competitiveness of vocational training institutions and ensure the relevance of training programs to labor market needs (Indrawati, S. M., & Kuncoro, 2021). Institutions that successfully establish strategic partnerships with various stakeholders perform better in terms of job placement rates for trainees and sustainability (Barnow, Burt S. and Smith, 2016).

The Systematic Literature Review (SLR) and bibliometric methods offer a systematic and structured approach to reviewing relevant literature related to strategic partnership management in vocational training institutions. SLR allows researchers to identify, evaluate, and synthesize existing research results in a transparent and reproducible manner (Azarian et al., 2023). Meanwhile, bibliometric analysis helps reveal research trends, identify leading authors and publications, as well as research collaboration maps in this field. In the context of vocational training institutions, the use of SLR and bibliometric methods can provide comprehensive insights into best practices and challenges in strategic partnership management (Inamdar, Z., et al, 2021; Rohit A, et al 2022). The Systematic Literature Review (SLR) approach is employed in this study to understand the concepts, strategies, and impacts of effective strategic partnerships in supporting workforce readiness in this era full of challenges and innovations. As such, the results of this study are expected to make a significant contribution to the development of theory and practice in strategic partnership management and help training institutions achieve effective collaboration.

METHODOLOGY

This study utilizes a systematic literature review (SLR) and bibliometric analysis (Bartolini, M. et al, 2019; Rojas-Sánchez et al., 2023). The protocol stages used as a foundation or guide are based on the PRISMA

Protocol, which consists of identification, screening, eligibility, and inclusion (Page et al., 2021). The bibliometric analysis procedure begins with defining the research objectives, formulating research questions, and developing a search strategy to gather the dataset (Donthu et al., 2021). This study combines the systematic stages of SLR and bibliometric analysis as they follow similar procedures, starting from determining research objectives, formulating research questions, developing a search strategy for data collection, and conducting analysis. The entire review process is conducted systematically, including the dataset search stage. Before starting a bibliometric analysis (BA), it is necessary to choose the database and apply filtering criteria, which include keywords, subject area, document type, source type, and language, as illustrated in Fig. 1. This method is particularly useful when the scope of the review is broad, and the dataset is too large to be manually reviewed (Bouhsaien, L & Azmani, 2024).

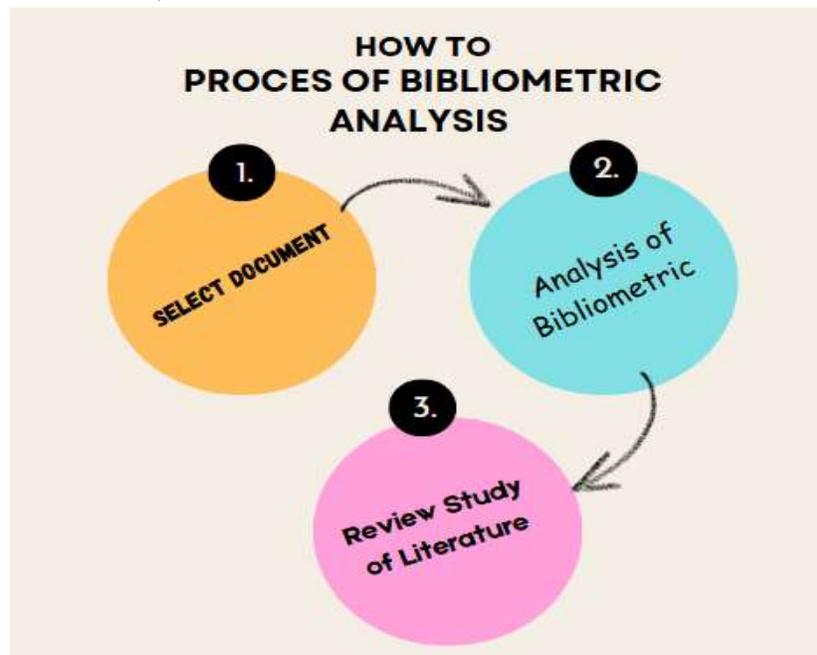


Fig.1 Proces Analysis of Bibliometric

Systematic Literature Search

The entire process of reviewing articles in this study was conducted systematically. The flow of actions established in the design (planning phase) was followed to guide the research implementation (Cooper et al., 2018). A dataset covering one decade was deemed sufficient to track research developments in this field. The datasets from Scopus, PubMed, Crossref, and Google Scholar are considered broad in scope, clean, reliable, and comprehensive, meeting recognized standards for high-quality publisher assessments for analysis and research (Baas et al., 2020). The dataset collection phase was carried out chronologically as follows: (1) Searching for journals in Scopus, PubMed, Crossref, and Google Scholar; (2) Recording search keywords as listed in Table 2, within the search areas of titles, abstracts, and keywords.

The keywords used were: Strategic Partnership, Management, Industry 5.0, and Workforce Skill Development (3) Setting boundaries for document types (articles and reviews), and (4) Setting the time frame

(between 2014 and 2024), (5) Ensuring selected articles were from Scopus, PubMed, Crossref, and Google Scholar, (6) After clicking search, 133 articles and reviews were obtained. The data were collected in .ris format and stored in the reference manager, Mendeley. For bibliometric analysis, the data in .ris format must be visualized using Vosviewer software. The next step is document screening or extraction by applying the inclusion and exclusion criteria previously defined during the identification stage.

Inclusion and Exclusion Criteria

At this stage, all articles and reviews were extracted (screened) to determine which data were suitable for SLR analysis. The selection criteria are presented in Table 1 below.

Table 1. Exclusion Selection Criteria

No.	Exclusion Criteria	Exclusion Results
1	Articles written in languages other than English	32 articles in Indonesian
2	Articles not relevant (keywords missing in title, abstract, or keywords)	11 related articles
3	Review publication type	10 reviews
4	Duplicates	-

Data extraction using the inclusion criteria from the exclusions described resulted in 80 articles. The articles were then assessed for eligibility.

Quality Assessment for Eligibility

The collected data will be evaluated using the following quality assessment question criteria:

Table 2. Inclusion Selection Criteria

No.	Inclusion Criteria	Inclusion Results
1	Articles published in journals indexed in Scopus, PubMed, Crossref, and Google Scholar between 2015 and 2024	75
2	Journal articles covering strategic partnership management and the empowerment of vocational training centers	70

Thus, a total of 70 articles were included after the inclusion selection process.

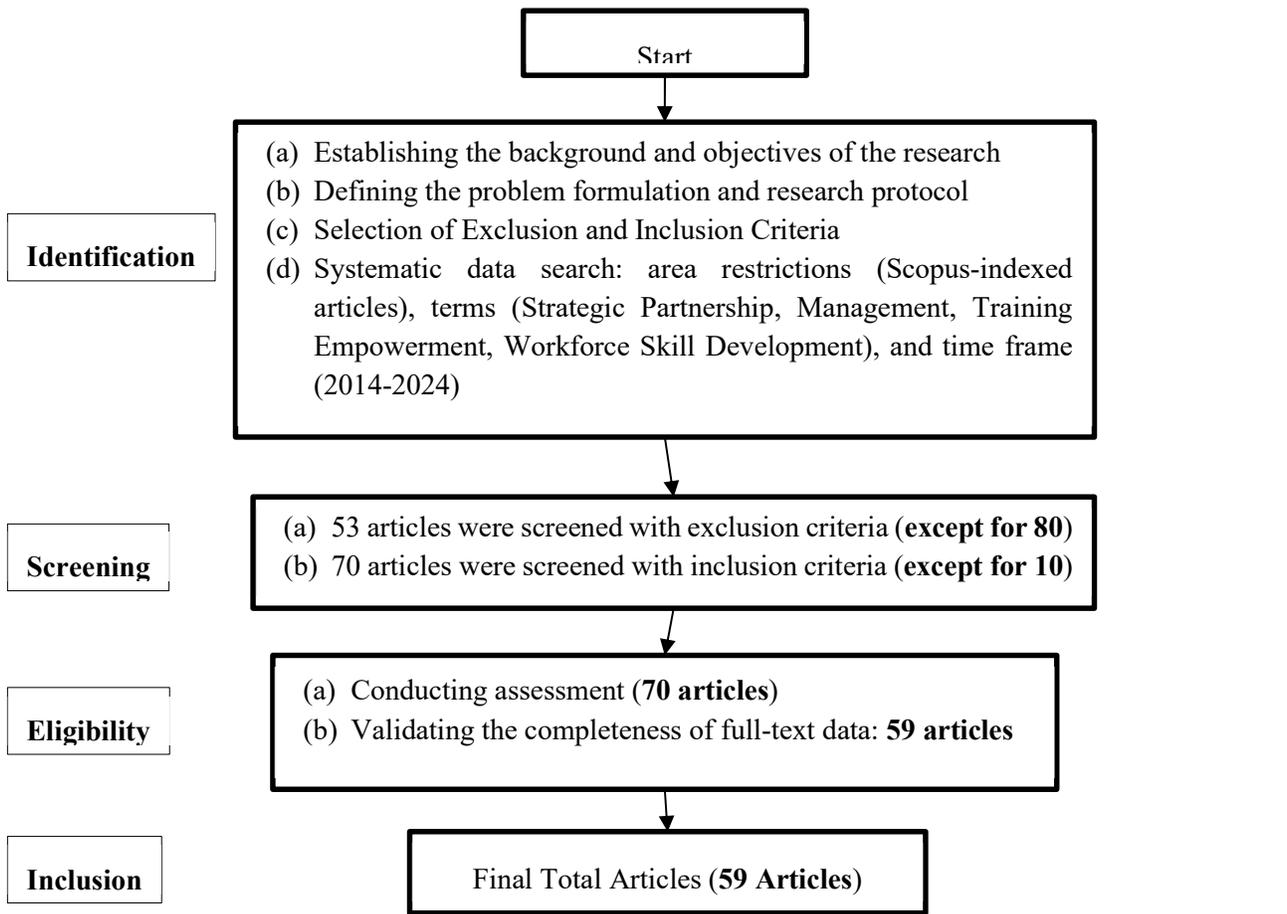


Figure 2. PRISMA Flow Diagram of the Systematic Literature Review Combined with Bibliometric Analysis

The flow diagram in Figure 2 provides a detailed summary of the SLR and bibliometric analysis process through the following steps: (1) In the identification phase, the objectives are first described. Then, it is important to develop the review protocol, followed by defining the conceptual boundaries of the study. The next steps are (1) the systematic data search for journal articles from 2013 to 2023 through Scopus, PubMed, Crossref, and Google Scholar, (2) in the screening phase, 53 articles were extracted using exclusion criteria. Subsequently, 80 articles were excluded; then, 10 articles were excluded in the inclusion criteria, (3) in the eligibility phase, the articles were validated and finalized, and (4) finally, the inclusion phase established 59 full-text articles that qualified for bibliometric analysis using Vosviewer, and their content was manually reviewed. Following this, the key phases are reporting and disseminating the results.

Instrument/Software

VOSviewer Online version 1.6.17 (Visualization of Similarities) was used to map and analyze the data, which can be downloaded from <http://www.vosviewer.com>. This software was developed by Leiden University, CWTS (Centre for Science and Technology Studies). VOSviewer Online is a useful tool for visualizing bibliometric networks or metadata in the field of bibliography, such as titles, authors, journals, abstracts, and keywords. The latest online version of VOSviewer is equipped with a sharing menu that allows readers to

independently and interactively explore the visualizations (van Eck & Waltman, 2010).

RESULTS AND DISCUSSION

Article Publication Trends

The analysis of article publication trends is conducted to gain a broader understanding of the research developments over a specific period. The researcher examined trends over the last 10 years (2014-2024) to track the growth and shifts in this research field over a more extended time frame.

In the past decade (2014-2024), article publication trends have shown significant fluctuations. In the early part of this period, the number of article publications remained relatively stable with a slight increase from 2014 (11.86%) to 2015 (16.95%). However, 2015 saw a drop back to the same level as in 2014, at 11.86%. A significant surge occurred in 2016, with document frequency reaching 18.64%, marking the peak of publication activity during this period. Following this, in 2017, the number of publications decreased again to 11.86%. From 2018 to 2021, there was a consistent decline in article publication frequency. In 2018, the rate dropped to 10.17%, followed by further declines in 2019 and 2021, both recording 6.78%. This downward trend reached its lowest point in 2022, with only 3 articles published, accounting for 5.08%. The declining trend continued into 2023 and 2024, where no articles were published at all.

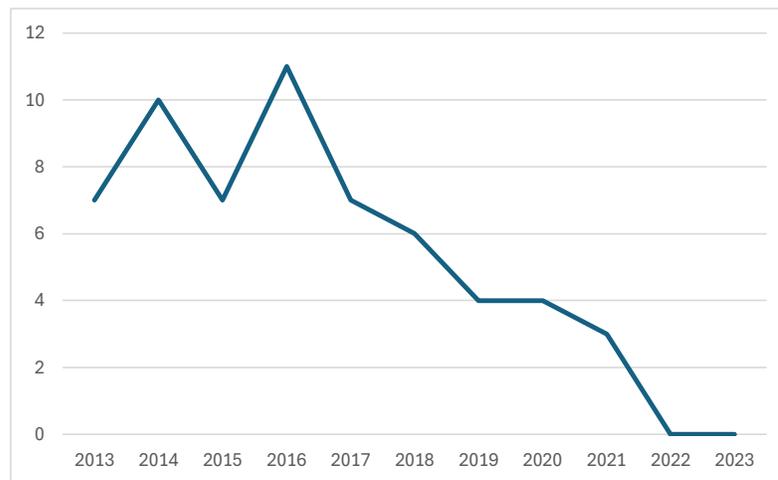
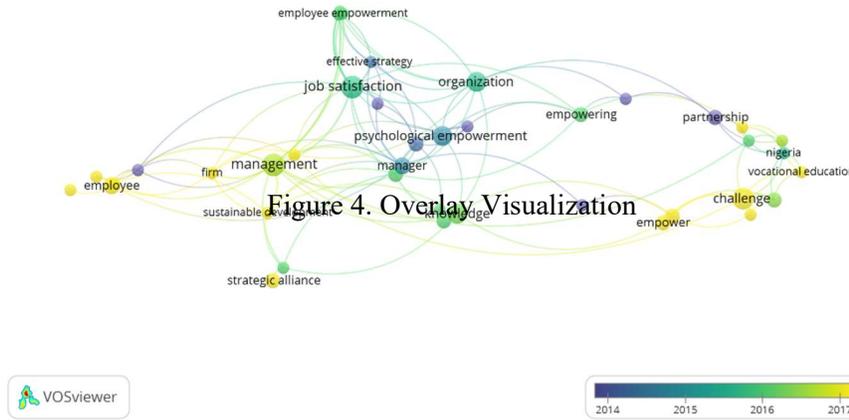


Figure 3. Research Trends from 2014 to 2024

Keyword Relationships

The VOSviewer output provides a visualization of the relationships between keywords used in the articles, as shown below.



The VOSviewer output visualization can be interpreted as follows. In the overlay visualization, the size of the circle around a word/phrase indicates how frequently that topic (word/phrase) has been researched. The larger the circle, the more frequently the topic has been studied, and vice versa. This reflects the popularity of a research topic over a specific time period. The curved lines connecting topics indicate that these topics have been studied together as research variables, highlighting thematic relationships and how the topics are interconnected. The color gradient from dark blue to bright yellow represents the time period during which the topics were researched. A brighter yellow indicates that the topic has been a more recent focus of research, while a darker blue suggests it was researched earlier. This color gradient shows the development of research trends within a specific field. The keywords in the 59 articles are interconnected, forming a pattern (Figure 3). Furthermore, the larger the area and the brighter the yellow, the more frequently the topic has been explored. The visualization of the density is displayed as follows.

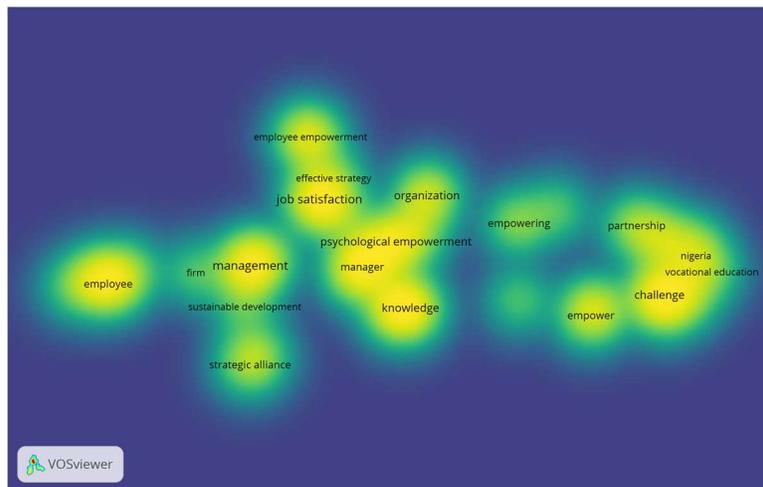


Figure 5. Density Visualization

Meanwhile, other topics are visualized with smaller circles (Figure 4) and a dimmer yellow color (Figure 5),

indicating that these topics have been less frequently researched.

DISCUSSION

Based on the bibliometric analysis of the initial 59 articles, it was found that strategic partnership management plays a crucial role in supporting the preparation for Industry 5.0 through vocational training institutions. Strategic partnership management in vocational training institutions in Indonesia aims to enhance the capacity and effectiveness of these institutions in meeting industry and labor market needs. This strategic partnership involves various stakeholders, such as the government, private sector, educational institutions, and non-governmental organizations, working together to design, implement, and evaluate relevant and high-quality training programs. Key factors like instructor quality, facility completeness, module availability, evaluation quality, material relevance, and input quality are important variables influencing training outcomes (Rasyad et al., 2019). In the context of strategic partnerships, these aspects can be improved through collaboration between training institutions and their strategic partners.

Collaboration between training institutions and industry is essential to ensure that training curricula align with labor market needs. Industry can provide input on the required skills and competencies and serve as a venue for internships or practical training for participants. Additionally, partnerships with the private sector can help provide modern and relevant training facilities and equipment. For instance, involving training instructors in working groups that include teaching discussions and demonstrations can enhance their professionalism, which is a key indicator of the success of vocational training programs (Wiyono & Triwiyanto, 2018).

Moreover, the government plays a key role in supporting and regulating these strategic partnerships. The government can provide financial support, regulations, and policies that encourage the participation of various stakeholders in vocational training programs (Barnow, Burt S. and Smith, 2016). Programs such as tax incentives for companies participating in vocational training or national certification for training institutions can serve as effective tools to enhance the quality and quantity of strategic partnerships. The importance of a collaborative supervisory approach can improve the competency-based performance of training instructors, which in turn will positively impact trainees' learning outcomes (Wiyono, 2018).

Furthermore, the quality and competence of training instructors play a crucial role in the success of vocational training programs. Experienced and well-trained instructors can deliver training materials more effectively and relevantly (Shawer, 2017). Instructor quality has a significant influence on training outcomes (Rasyad et al., 2019). Therefore, partnerships with training institutions can help improve instructor competence, and training and certification for instructors should also be integrated into this strategic partnership approach.

Meanwhile, one of the key aspects of this partnership is the improvement of the quality of instructors and trainers. Training programs, such as leadership enhancement for school principals, can improve the instructional leadership quality of principals (Anselmus Dami et al., 2022). Therefore, if vocational training institutions can partner with competent educational and training organizations, the quality of instructors at vocational institutions can improve, thereby enhancing the training outcomes provided (Itohan Oviawe, 2017; Kovalchuk et al., 2022).

In addition to improving instructor quality, collaboration between vocational training institutions and various stakeholders is also crucial. Collaborative supervision approaches and collegial supervision techniques significantly influence the intensity of performance-based learning used by instructors (Wiyono et al., 2021). By collaborating with other educational and training institutions, vocational training centers can implement

these supervision techniques to ensure the quality of training remains high and aligned with labor market needs (Werner, E et al., 2015).

Strategic partnerships also involve the provision of adequate facilities and training modules. The completeness of facilities and availability of training modules are important variables that significantly contribute to training outcomes (Rasyad et al., 2019). In strategic partnerships, vocational training institutions can collaborate with various parties to ensure that facilities and training modules are regularly updated and aligned with technological advancements and industry requirements.

Partnerships with religious educational institutions, for example, can also be an effective strategy. Programs like "nyantri" (students staying at religious boarding schools) can help strengthen organizational cultural values in institutions (Arifin et al., 2018). In the context of vocational training institutions, partnerships with pesantren or religious education institutions can help instill strong moral and work ethic values in trainees, which are crucial in the workplace. Thus, the strategic partnership management of vocational training institutions in Indonesia includes improving instructor quality, collaborating with other institutions, providing adequate facilities and modules, and integrating moral and ethical values through partnerships with religious institutions. Through this approach, vocational training institutions can become more empowered and capable of delivering high-quality training that is relevant to the current and future needs of the industry (Okolie, U.C et al 2020).

On the other hand, continuous evaluation and adjustment of vocational training programs are crucial to ensure that these programs remain relevant and effective. Feedback from trainees, companies, and instructors should be collected and analyzed to identify the strengths and weaknesses of the programs (Lacerenza et al 2017). Based on this evaluation, training programs can be updated and adjusted to meet the latest industry needs and developments. This approach aligns with findings that continuous improvement through supervision and evaluation can enhance professionalism and teaching quality (Wiyono & Triwiyanto, 2018) . Therefore, effective strategic partnership management can contribute to empowering vocational training institutions in Indonesia, making them more adaptive and responsive to changes in the labor market.

Strategic partnership management in vocational training institutions has become increasingly important in preparing the workforce for the Industry 5.0 era, which emphasizes the harmonious collaboration between humans and technology, with a focus on innovation, personalization, and sustainability. In this regard, vocational training institutions need to adapt their approach through strategic partnerships to create curricula and training programs that are relevant to the ever-evolving needs of the industry.

Strategic partnerships involve structured collaboration between training institutions and various stakeholders such as industry, government, higher education institutions, and technology companies. Through such collaboration, training institutions can gain access to the latest technology, broader resources, and practical knowledge about industry trends. This enables the institutions to develop programs that not only focus on technical skills but also support soft skills and the workforce's ability to adapt to changes in the industrial world.

In this study, it was found that the success of strategic partnership management depends on several key factors. One such factor is the clarity of a shared vision and alignment of goals between the training institutions and their partners. This alignment is crucial to ensure that all parties are working toward the same objectives in developing a workforce ready to face the challenges of Industry 5.0. Additionally, open communication is also a vital element in maintaining transparency and trust among the partners (Richard L at al 2004). Open communication facilitates more effective information exchange and quicker problem-solving.

A dynamic and sustainable learning ecosystem is also the result of a successful strategic partnership. With the active involvement of industry and academic partners, vocational training institutions can periodically adjust their curricula in line with technological developments and market trends. Moreover, government involvement is crucial in creating policies that support this collaboration, such as providing incentives for industries engaged in workforce training or developing industry-based curricula.

The Industry 5.0 era requires training institutions to become more flexible, innovative, and technology-oriented. In this regard, strategic partnership management offers a solution that enables training institutions not only to enhance their capabilities but also to create a more adaptive workforce ready to face future challenges. Strong collaboration between sectors provides a solid foundation for the creation of a training ecosystem that supports workforce transformation in this digital era.

CONCLUSION

Based on the bibliometric analysis of 59 related articles, it is evident that strategic partnership management is crucial in vocational training in Indonesia, playing a vital role in preparing a workforce ready to face the challenges of Industry 5.0. These partnerships involve collaboration between the government, private sector, educational institutions, and non-governmental organizations in designing, implementing, and evaluating high-quality vocational training programs that are relevant to industry needs. Through strategic partnerships, the quality of instructors, facilities, and training materials can be enhanced, resulting in graduates who are more job-ready and competent. The government also plays a key role in supporting these partnerships through policies and regulations that encourage the participation of various stakeholders.

Strong partnerships with companies, the government, and educational institutions enable vocational training institutions to improve curricula, access the latest technologies, and adjust training programs to meet the ever-changing needs of industry. The success of these strategic partnerships depends on the alignment of vision and goals, effective communication, and a commitment to creating a sustainable learning ecosystem. In the face of Industry 5.0, a deeper integration between vocational training programs and industry demands is essential, resulting in an innovative, adaptive, and competitive workforce in the increasingly global market.

The implications of this research suggest that vocational training institutions in Indonesia need to strengthen their strategic partnership management to improve their effectiveness and competitiveness. Collaboration with industry and the private sector can ensure that training curricula remain up-to-date with labor market needs, while partnerships with educational institutions can enhance the competence of instructors. Additionally, government support through appropriate incentives and regulations can expand and strengthen strategic partnership networks. With effective partnership management, vocational training institutions in Indonesia can become more empowered and adaptive in facing the dynamic changes in the labor market.

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