



Integrating Educational Management Functions to Strengthen Link and Match Learning in Vocational Education

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ABSTRACT

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This study aims to analyze the implementation of educational management functions in strengthening the link and match approach between vocational education and the needs of business and industry. A qualitative library research method was employed using data collected from scholarly journal articles, books, government policy documents, regulations on vocational education, and other relevant studies. Data were gathered through documentation and literature review and analyzed using content analysis, including data reduction, data presentation, interpretation, and conclusion drawing. The findings indicate that the successful implementation of the link and match approach depends on the effective application of educational management functions. Planning is reflected in curriculum alignment with industry needs; organizing is realized through strengthening partnerships with business and industry; implementation is carried out through practice-based learning and the involvement of industry practitioners; while controlling is conducted through learning evaluation, tracer studies, and industry feedback. The study implies that strengthening educational management practices can improve the relevance of vocational education, enhance graduate competencies, and reduce the gap between educational outcomes and labor market demands.

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INTRODUCTION

Vocational education plays a strategic role in preparing a skilled workforce capable of meeting the dynamic demands of the labor market (Hiim, 2022). Unlike academic education, which primarily emphasizes theoretical knowledge, vocational education focuses on developing practical competencies, technical expertise, and workplace readiness (Schwede et al., 2025). As industrial

transformation accelerates through the Fourth Industrial Revolution and the transition toward Society 5.0, industries increasingly require graduates who possess not only technical competencies but also critical thinking, creativity, collaboration, communication, digital literacy, adaptability, and problem-solving skills. Consequently, vocational education institutions are expected to continuously improve the quality of their learning management systems to ensure that graduates remain relevant to evolving industrial requirements (Sauli et al., 2021). Previous studies have emphasized that effective vocational education management significantly contributes to improving graduate employability and industrial competitiveness by integrating educational objectives with workforce demands (Curto-Reverte et al., 2025). Therefore, strengthening the management of vocational education has become an essential strategy for supporting sustainable economic development and enhancing national human resource competitiveness.

The importance of vocational education extends beyond the educational sector because it directly influences economic productivity, industrial innovation, and social welfare. Governments worldwide have recognized that strengthening collaboration between educational institutions and industries is fundamental to producing graduates whose competencies correspond to labor market expectations. In Indonesia, this objective has been promoted through the implementation of the link and match policy, which encourages vocational institutions and business and industry sectors (DUDI) to collaborate in curriculum development, industrial internships, competency certification, practitioner involvement in teaching (Zhao & Ko, 2024), and graduate recruitment. Such collaboration is expected to reduce the competency gap between education and employment while increasing workforce productivity (Wahyudin et al., 2025). Evidence suggests that vocational institutions implementing comprehensive industry collaboration demonstrate higher graduate employability and stronger institutional performance than those relying solely on conventional classroom-based learning (Muslichuddin et al., 2025). Therefore, optimizing the implementation of the link and match concept is essential for ensuring that vocational education effectively contributes to sustainable industrial and national development.

Despite various governmental initiatives, vocational education continues to encounter significant challenges in aligning graduate competencies with the rapidly changing needs of business and industry. The implementation of the link and match policy has not yet fully achieved its intended objectives because many vocational institutions still experience curriculum misalignment, limited industrial participation in learning activities, inadequate practical facilities, and inconsistent competency evaluation systems. These challenges have contributed

to the persistence of graduate competency mismatches and relatively high unemployment among vocational graduates. The problem is further exacerbated by the rapid evolution of industrial technologies, requiring educational institutions to update learning content and instructional methods continuously. Consequently, educational management functions, including planning, organizing, implementation (Parker, 2024), supervision, and evaluation, have become increasingly important in ensuring that vocational learning remains responsive to industrial transformation. Without effective educational management (Wu et al., 2022), vocational institutions face difficulties in producing graduates capable of adapting to technological advancement and labor market dynamics, thereby reducing the effectiveness of vocational education in supporting economic development.

Empirical evidence further demonstrates that the implementation of link and match remains uneven across vocational education institutions. Research conducted by Mudianto reported that the unemployment rate among senior secondary vocational graduates in Mojokerto Regency reached 6.76% in 2024, indicating that many graduates still lacked competencies aligned with industrial requirements. The study identified curriculum synchronization, institutional partnerships with business and industry, industry involvement in teaching activities, and structured workplace learning as critical determinants of successful link and match implementation (Arinaitwe, 2021). Similarly, a systematic literature review conducted by Setyawan revealed that vocational graduate unemployment remained above 8% due to persistent competency mismatches between educational outcomes and labor market expectations. The review recommended strengthening vocational education management through curriculum synchronization, improved industrial training quality, and sustainable collaboration with business and industry partners (Yu et al., 2025). These findings confirm that improving educational management is fundamental to achieving effective vocational learning aligned with industrial needs.

Further studies have also highlighted that the implementation of the link and match policy has not completely eliminated the competency gap between vocational graduates and industrial expectations. Existing research indicates that several constraints continue to hinder the effectiveness of vocational education (Jaedun et al., 2024), including curricula that are insufficiently responsive to technological developments, limited participation of industry practitioners in instructional activities (Yoto et al., 2024), inadequate laboratory and workshop facilities, and disparities in the quality of implementation across institutions. In response to these challenges, the Indonesian government has intensified efforts to strengthen vocational education through various strategic programs. The Strategic Plan of the Directorate General of Vocational Education emphasizes

that the success of vocational higher education should be measured not merely by the number of cooperation agreements but also by the extent to which study programs implement industry-based curriculum development, structured internships, practitioner-led teaching, industrial training for lecturers, and graduate recruitment commitments (Ling et al., 2021). These initiatives indicate that sustainable collaboration between educational institutions and industry has become a key indicator of vocational education quality.

Previous studies have substantially contributed to understanding the implementation of the link and match policy; however, several important limitations remain. Most studies have primarily focused on evaluating policy implementation, graduate employability (Wahyuningsih et al., 2025), curriculum synchronization, or the effectiveness of industrial partnerships independently. Others have examined the influence of internships, competency certification, or teaching factory programs on graduate readiness without comprehensively explaining how educational management functions integrate these components into a coherent learning system (Thongnun et al., 2025). Likewise, existing research has rarely analyzed the interrelationship between planning, organizing, implementation, supervision, and evaluation as an integrated managerial framework for strengthening vocational learning aligned with industrial needs. Consequently, limited attention has been given to understanding how educational management practices systematically influence the success of the link and match approach. This research gap indicates the need for a more comprehensive analysis that places educational management as the central framework for developing effective vocational learning and sustainable collaboration with business and industry (Liu & Paramalingam, 2025).

This study offers a novel perspective by positioning educational management as the principal framework for strengthening link and match based vocational learning rather than treating curriculum alignment, industrial collaboration, internships, and competency development as separate elements. The proposed framework integrates planning, organizing, implementation, supervision, and evaluation into a unified management cycle that continuously aligns educational processes with evolving industrial demands. Such an integrated perspective provides a more comprehensive understanding of how vocational institutions can systematically improve learning quality, institutional partnerships, and graduate competencies. By emphasizing managerial integration, this study contributes a holistic model that supports continuous improvement, institutional adaptability, and sustainable collaboration with

industry. The findings are expected to provide a conceptual foundation for developing more responsive vocational education governance capable of producing competent, adaptive, and competitive graduates in an increasingly dynamic labor market.

Based on the foregoing discussion, this study addresses the question of how educational management functions can strengthen the implementation of link and match learning in vocational education to better respond to industrial needs. It argues that the effectiveness of vocational learning depends not only on government policies or industrial participation but also on the successful integration of planning, organizing, implementation, supervision, and evaluation within institutional management practices. When these managerial functions operate cohesively, vocational institutions are more likely to develop industry-oriented curricula, establish sustainable partnerships with business and industry, implement authentic workplace learning, and evaluate graduate competencies according to industrial standards. Therefore, this study seeks to analyze the application of educational management functions in developing link and match learning, identify the supporting and inhibiting factors affecting its implementation, and formulate strategic recommendations for strengthening vocational education governance to enhance graduate employability and industrial competitiveness.

RESEARCH METHODS

This study employed a qualitative research approach using a library research design (Alt et al., 2023). A qualitative approach was selected because the study aimed to obtain an in-depth understanding of educational management in developing link and match learning between vocational education and industry through the interpretation and synthesis of existing literature rather than numerical measurement (Dahalan et al., 2023). Library research was considered appropriate because the research questions focused on conceptual analysis, policy interpretation, and theoretical integration derived from published academic sources and official documents (Huang, 2025). Since this research did not involve direct field observations or human participants, no specific research site was determined. Instead, the investigation was conducted by systematically examining scientific literature related to vocational education management, educational policies, industrial collaboration, and the implementation of the link and match concept. This design enabled the researchers to develop a comprehensive understanding of the phenomenon by integrating findings from diverse and credible sources.

The data used in this study consisted of both primary and secondary sources. Primary data included peer-reviewed journal articles, government policy documents, regulations concerning vocational education, and official

publications related to the implementation of link and match programs. Secondary data comprised books, conference proceedings, undergraduate theses, master's theses, doctoral dissertations, and previous research reports that supported the conceptual framework of the study. Data collection was conducted through documentation and literature review techniques by systematically identifying, selecting, and examining relevant publications from academic databases, official government websites, and other credible online sources. Every document was evaluated according to its relevance, credibility, publication quality, and consistency with the research objectives (Luo, 2025). This systematic collection process ensured that the analyzed data represented current scientific knowledge and authoritative policy perspectives regarding vocational education management and collaboration with business and industry.

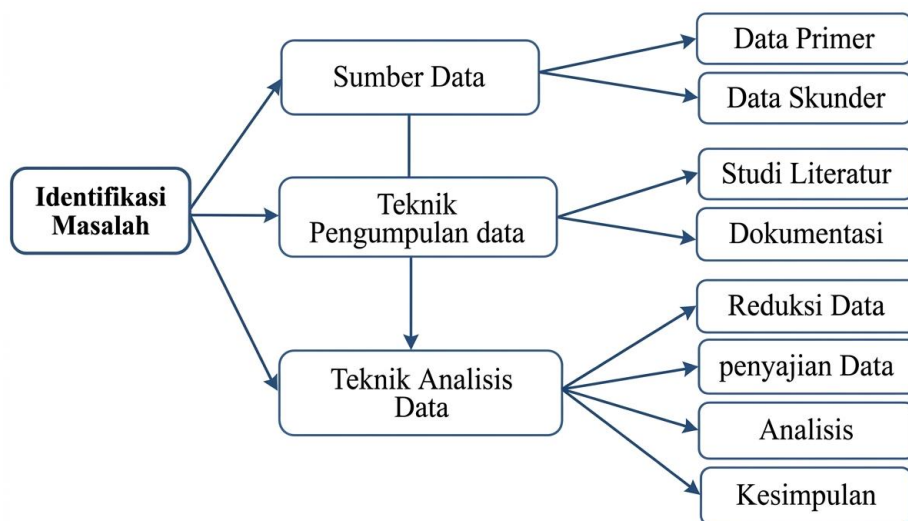


Figure 1. Research Flow of the Library Research on Vocational Education Management in Developing Link and Match Learning with Industry

Figure 1 illustrates the sequence of the research process adopted in this study. The procedure begins with problem identification, followed by the determination of data sources, consisting of primary data (scientific journal articles, government policy documents, and regulations related to vocational education) and secondary data (books, conference proceedings, theses, dissertations, and research reports). Subsequently, data were collected through literature review and documentation techniques. The collected information was then analyzed using qualitative content analysis involving data condensation, data display, data verification, and conclusion drawing, resulting in a comprehensive interpretation of vocational education management in strengthening link and match learning with business and industry.

The collected data were analyzed using content analysis, which allowed the researchers to interpret patterns, concepts, and relationships among the selected documents. The analysis followed four sequential stages adapted from qualitative data analysis procedures, namely data condensation, data display, data verification, and conclusion drawing. During the data condensation stage, relevant information was selected, categorized, and simplified according to the research focus. Subsequently, the organized findings were presented through thematic data displays to facilitate comparison and interpretation across different sources. The verification stage involved examining the consistency of findings through cross-referencing multiple documents and confirming the logical coherence of emerging themes (Phusavat et al., 2021). Finally, conclusions were formulated by synthesizing the analyzed evidence into an integrated explanation of how educational management functions contribute to strengthening link and match learning in vocational education. This analytical procedure ensured the credibility, transparency, and trustworthiness of the research findings.

RESULTS AND DISCUSSION

Planning Function in Strengthening Link and Match Learning

The literature synthesis demonstrates that the planning function constitutes the foundation for developing vocational education that effectively supports link and match learning with business and industry. Planning extends beyond the preparation of instructional activities by incorporating systematic analyses of industrial competency requirements into curriculum development, graduate learning outcomes, teaching materials, assessment strategies, and practical learning programs. The reviewed studies consistently indicate that vocational institutions implementing industry-based planning are better positioned to produce graduates whose competencies correspond with labor market expectations. The planning process generally begins with a comprehensive needs assessment involving industry representatives, professional associations, tracer studies, and graduate employers to identify both technical competencies and transferable skills required in contemporary workplaces. Consequently, planning becomes a strategic mechanism through which vocational institutions align educational objectives with industrial development while reducing competency mismatches that frequently contribute to graduate unemployment (Hana et al., 2024).

These findings are consistent with previous studies emphasizing that curriculum alignment is one of the most influential determinants of successful link and match implementation. Vocational education should continuously adjust learning outcomes to industrial transformation to maintain graduate competitiveness. Furthermore, the transition toward Industry 4.0 and Society 5.0

requires curricula that integrate technical expertise with digital literacy, creativity, collaboration, and problem-solving skills to prepare graduates for increasingly dynamic workplace environments. The present study extends these perspectives by demonstrating that curriculum synchronization alone is insufficient unless it is embedded within a comprehensive educational management framework encompassing strategic planning, resource allocation, industry collaboration, instructional design, and competency evaluation. Therefore, planning should be understood as an integrated managerial function rather than merely an administrative activity, enabling vocational institutions to anticipate technological changes while continuously adapting educational practices to evolving industrial expectations.

Another significant finding concerns the strategic integration of practice-based learning into institutional planning. The reviewed literature reveals that vocational institutions increasingly incorporate teaching factories, structured industrial internships, project-based learning, industrial visits, and competency certification into their annual academic plans. Rather than functioning as complementary activities, these programs are designed as integral components of curriculum implementation to ensure that theoretical knowledge is continuously reinforced through authentic workplace experiences. The planning process also includes preparing qualified lecturers through upskilling and reskilling initiatives while investing in laboratories, workshops, and digital learning technologies capable of simulating industrial environments (Avana et al., 2024). Such comprehensive planning enables vocational institutions to establish sustainable learning ecosystems where educational resources, industrial collaboration, and competency development operate in a coordinated manner to improve graduate employability and institutional responsiveness.

From a theoretical perspective, these findings reinforce educational management theory by demonstrating that planning should be conceptualized as a dynamic process integrating environmental analysis, stakeholder collaboration, and continuous curriculum innovation rather than as a static administrative activity. Practically, the findings suggest that vocational institutions should institutionalize industrial needs assessments, establish formal mechanisms for curriculum co-development with industry, and allocate sufficient resources for educator development and practical facilities before implementing learning programs. The novelty of this study lies in positioning planning as the central mechanism linking curriculum design, industrial collaboration, resource management, and competency development within a unified educational management framework. Unlike previous studies that predominantly discussed curriculum synchronization independently, this research illustrates how strategic planning orchestrates all managerial

components to strengthen link and match learning, thereby providing a more holistic framework for improving vocational education governance and graduate competitiveness.

Organizing Function in Strengthening Link and Match Learning

The literature synthesis indicates that the organizing function plays a critical role in translating strategic planning into coordinated institutional actions that support the implementation of link and match learning. Organizing involves structuring institutional resources, assigning responsibilities, and establishing effective coordination mechanisms to ensure that vocational education responds to the needs of business and industry. The reviewed studies reveal that successful implementation depends on the establishment of organizational structures capable of connecting educational institutions with industrial partners through collaborative governance. Consequently, vocational institutions commonly establish dedicated units responsible for industrial partnerships, curriculum development, internship coordination, and quality assurance. These organizational arrangements ensure that the implementation of link and match learning is not solely the responsibility of lecturers or teachers but becomes a collective institutional commitment involving academic leaders, administrative personnel, and industrial stakeholders (Khomsah et al., 2025). Such organizational integration enables vocational institutions to maintain consistency between educational objectives and industrial expectations.

The findings further demonstrate that organizing extends beyond institutional structures to include a systematic distribution of responsibilities among educators, administrative staff, and industry practitioners. Lecturers are primarily responsible for designing learning activities, facilitating classroom instruction, and supervising students throughout the learning process, whereas industry practitioners contribute practical expertise as guest lecturers, mentors, instructors, and competency assessors. Their participation allows students to experience authentic workplace practices, understand industrial culture, and familiarize themselves with current technologies and professional standards. These collaborative roles strengthen the connection between theoretical instruction and practical application, thereby improving students' readiness for employment. Furthermore, the involvement of industry professionals enriches the learning environment by introducing real-world perspectives that cannot always be replicated within conventional classroom settings. This collaborative arrangement reinforces the objective of link and match, which emphasizes continuous interaction between educational institutions and industrial partners throughout the learning process.

Another important finding concerns the organization of supporting

academic programs designed to strengthen vocational competencies. The reviewed literature shows that industrial internships, teaching factories, industrial visits, competency certification, and collaborative research activities are systematically integrated into the academic calendar to avoid scheduling conflicts and maximize learning outcomes. These activities are coordinated across different institutional units to ensure that each program contributes directly to the achievement of graduate learning outcomes. In addition to academic coordination, vocational institutions organize the utilization of laboratories, workshops, learning equipment, and academic information systems to provide equitable learning opportunities for all students. Effective management of these supporting resources enables students to develop practical competencies using facilities that reflect industrial standards. Simultaneously, continuous communication with industrial partners through coordination meetings, joint evaluations, and discussion forums facilitates timely responses to technological developments and emerging competency requirements, thereby maintaining the relevance of vocational learning.

From the perspective of educational management, these findings suggest that organizing should be viewed as a strategic mechanism that integrates institutional governance, human resources, industrial collaboration, and learning support systems into a coherent operational framework. Previous discussions on link and match frequently emphasize industrial partnerships as isolated activities; however, the present findings demonstrate that their effectiveness depends on the quality of institutional organization that coordinates all stakeholders toward shared educational objectives. Theoretically, this reinforces the managerial principle that organizational effectiveness determines the successful implementation of educational innovations. Practically, vocational institutions should establish clear organizational structures, define stakeholder responsibilities, strengthen communication channels with industrial partners, and develop integrated coordination systems to support sustainable collaboration. The contribution of this study lies in demonstrating that organizing functions not merely as an administrative process but as a strategic driver that transforms educational planning into coordinated institutional practices capable of strengthening link and match learning and improving graduate competitiveness (Tumanggor et al., 2021).

Actuating Function in Strengthening Link and Match Learning

The literature synthesis reveals that the actuating function represents the implementation stage in which all educational plans are translated into learning activities that directly support the link and match approach. At this stage, vocational institutions operationalize previously developed plans through

learning experiences that actively involve students, educators, and business and industry partners. The primary objective is to ensure that the learning process develops not only theoretical understanding but also occupational competencies required by the labor market. Consequently, learning implementation becomes the core mechanism through which vocational education transforms institutional planning into practical experiences that enhance students' work readiness and professional competence. Effective implementation therefore requires close collaboration between educational institutions and industrial partners to ensure that learning activities remain relevant to current technological developments and workplace expectations (Sulistio, 2024).

The findings indicate that business and industry are no longer positioned merely as providers of internship opportunities but as active partners throughout the learning process. Industry practitioners participate as guest lecturers, instructors, mentors, and competency assessors who contribute practical knowledge and professional experience directly to students. Their involvement enables students to understand industrial workflows, organizational culture, technological applications, and competency standards that characterize contemporary workplaces. This collaboration also creates authentic learning experiences by allowing students to interact with professionals who possess extensive industrial expertise. As a result, the learning environment becomes more contextual and responsive to industrial needs, reducing the gap between academic instruction and workplace practice while strengthening the implementation of the link and match concept in vocational education.

The literature further demonstrates that the implementation of link and match learning is strengthened through the application of innovative instructional models, including Project-Based Learning (PjBL), Problem-Based Learning (PBL), Teaching Factory (TEFA), and production-based learning. These approaches provide opportunities for students to solve practical problems, complete industry-oriented projects, and experience learning situations that closely resemble professional working environments. Through these activities, students simultaneously develop technical competencies and essential employability skills such as communication, teamwork, leadership, discipline, adaptability, and problem-solving. Furthermore, structured industrial internships provide students with direct exposure to workplace environments where they can apply acquired knowledge, understand organizational practices, and strengthen their professional confidence before entering the labor market. Such learning experiences significantly improve graduates' readiness to meet industrial expectations and adapt to changing workplace demands.

The findings are consistent with the perspective that vocational education achieves its objectives when learning activities are closely integrated with

authentic industrial experiences rather than relying predominantly on classroom instruction. This study further demonstrates that the effectiveness of learning implementation depends not only on the availability of industrial placements but also on the systematic involvement of industry practitioners, the adoption of innovative learning models, and the integration of practical experiences throughout the educational process. Theoretically, these findings reinforce the view that the actuating function serves as the connecting element between educational planning and competency achievement. Practically, vocational institutions should strengthen long-term partnerships with industry, expand practitioner participation in teaching, and optimize practice-based learning models to improve graduate employability. The contribution of this study lies in demonstrating that effective implementation requires the integration of instructional strategies, industrial collaboration, and experiential learning within a comprehensive educational management framework rather than treating these elements as separate educational initiatives.

Controlling and Evaluation Function in Strengthening Link and Match Learning

The literature synthesis indicates that the controlling and evaluation functions are essential components of educational management because they ensure that the implementation of link and match learning remains consistent with institutional objectives and industrial expectations. Controlling is conducted continuously throughout the learning process to monitor curriculum implementation, practical learning activities, teaching factory operations, industrial internships, and the achievement of graduate learning outcomes. These monitoring activities involve institutional leaders, program coordinators, quality assurance units, lecturers, and industrial supervisors, creating a collaborative quality assurance mechanism that supports continuous improvement. Through systematic supervision, vocational institutions are able to identify implementation gaps, evaluate learning effectiveness, and ensure that every educational activity complies with predetermined competency standards. Consequently, controlling serves not only as an administrative function but also as a strategic process for maintaining the relevance and quality of vocational education in response to industrial development (Busnawir et al., 2025).

The findings further demonstrate that evaluation is implemented through multiple assessment methods designed to measure both academic achievement and occupational competence. Student competencies are assessed through competency examinations, project assessments, practical performance evaluations, and industrial internship assessments, allowing educational institutions to examine students' ability to apply theoretical knowledge in

authentic workplace contexts. A distinctive characteristic of the link and match approach is the active participation of industry representatives in the evaluation process as competency assessors and providers of professional feedback. Their involvement ensures that graduate competencies are evaluated according to current industrial standards rather than solely academic criteria. Consequently, evaluation outcomes provide more comprehensive evidence regarding graduates' work readiness and professional competence while simultaneously strengthening the credibility of vocational education among business and industry partners.

The literature also reveals that institutional evaluation extends beyond classroom learning by examining the overall effectiveness of vocational education programs through tracer studies, employer satisfaction surveys, and partnership evaluations. Tracer studies provide information regarding graduate employment rates, waiting periods before obtaining employment, and the alignment between occupational positions and acquired competencies. Employer satisfaction surveys complement these findings by identifying strengths and weaknesses in graduate performance based on workplace experiences. In addition, periodic evaluations of institutional partnerships enable vocational institutions to assess the sustainability and effectiveness of collaboration with business and industry. These evaluation mechanisms generate valuable evidence for curriculum revision, instructional improvement, educator professional development, facility enhancement, and the expansion of industrial cooperation. Therefore, evaluation functions as a continuous feedback system that supports institutional learning and long-term quality improvement rather than serving merely as a measurement of educational outcomes.

These findings support the argument that effective controlling and evaluation represent the final managerial functions that complete the educational management cycle by providing evidence for continuous institutional improvement. Unlike conventional evaluation systems that primarily emphasize students' academic achievement, the present findings demonstrate that link and match learning requires multidimensional evaluation involving educational institutions, industrial partners, graduates, and employers. Theoretically, this finding strengthens educational management theory by positioning controlling and evaluation as dynamic feedback mechanisms that continuously connect educational implementation with industrial needs. Practically, vocational institutions should establish integrated monitoring systems, institutionalize tracer studies and employer satisfaction surveys, and actively involve industry practitioners in competency assessment to ensure that educational programs remain responsive to technological advancement and labor market changes. The contribution of this study lies in demonstrating that systematic supervision and

comprehensive evaluation are indispensable managerial strategies for sustaining curriculum relevance, improving graduate competencies, and reducing the persistent mismatch between vocational education outcomes and industrial workforce requirements.

CONCLUSION

This study demonstrates that the successful implementation of link and match learning in vocational education depends on the effective integration of the four core educational management functions: planning, organizing, actuating, and controlling. The principal lesson derived from this study is that vocational education can effectively respond to industrial demands only when curriculum planning, institutional organization, learning implementation, and continuous evaluation operate as an interconnected management system rather than as isolated activities. The study contributes to the field of educational management by proposing a comprehensive conceptual framework that positions the POAC functions as an integrated managerial cycle for strengthening vocational learning and reducing the competency gap between graduates and labor market requirements. This perspective enriches the existing literature by emphasizing educational management as the central mechanism for achieving sustainable collaboration between vocational institutions and business and industry. Nevertheless, this study is limited by its reliance on a qualitative library research approach, which does not provide empirical evidence from institutional practices or stakeholder experiences. Future research is therefore recommended to employ case studies, mixed-methods, or comparative research across vocational institutions to validate the proposed framework, examine its practical effectiveness in different educational contexts, and identify additional organizational factors influencing the successful implementation of link and match learning.

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