Strengthening The Competitiveness of Indonesian Industry Human Resources Through IQF-Based Workplace Learning

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A B S T R A C T

This study develops a Workplace Learning (WPL) model based on the Indonesian Qualification Framework (IQF) to enhance workforce competitiveness in Indonesia's industrial sector. Addressing the existing competency gap between workforce skills and industry demands, this research integrates formal, informal, and experience-based learning approaches. Using grounded theory, data were collected from state-owned fertilizer companies, including annual reports and HR policy documents. The findings reveal that a combination of structured training, mentoring, on-the-job training, job rotation, and industry practice significantly boosts workforce competencies. Certification processes and managerial support, including career planning and competency-based recruitment, emerge as critical elements in aligning learning programs with industry needs. The developed model not only adheres to national standards but also aligns with global demands, fostering innovation, employee engagement, and long-term competitiveness. This study provides practical insights for industries and governments to design sustainable human resource development strategies. The proposed model highlights the importance of integrating WPL with national qualification frameworks, ensuring workforce adaptability and productivity in facing rapid technological advancements. Companies can leverage this model to build a more resilient and agile workforce, while policymakers may use it to bridge skill gaps and drive economic growth. By aligning education, training, and industry practices, the study contributes to improving labor mobility and promoting equitable workforce development, ultimately positioning Indonesia's industrial sector competitively in the global market.

1. INTRODUCTION

In an effort to strengthen the competitiveness of Indonesian industrial human resources (HR), the role of the state and companies in developing workforce skills is crucial, in line with ILO recommendation No. 195 on HR development, education, training, and lifelong learning. ILO member countries are obliged to design and implement sustainable HR development policies through investment in education and training that is integrated with industry needs, with a special focus on vulnerable groups and the informal sector. On the other hand, companies have a responsibility to continuously improve employee skills through on-the-job training, mentoring, and experience-based competency recognition (ILO, 2004). The synergy between state policies and company initiatives, the oldest of which is the Kerangka Kualifikasi Nasional Indonesia (Indonesian Qualification Framework, IQF), is key to creating an adaptive and innovative workplace learning ecosystem (Derrick, 2020). This approach not only increases the relevance of workforce skills to industry needs, but also strengthens the competitiveness of Indonesian HR amidst increasingly dynamic global competition (Tan & Sim, 2022; Urias, 2019).

Indonesia faces a major challenge in improving the competitiveness of its workforce, especially in facing global competition and the Fourth Industrial Revolution. Despite having a large productive age population, the composition of Indonesia's workforce is still dominated by groups with basic (51.40 percent) and secondary (34.82 percent) education levels, while only 12.86 percent have higher education. As many as 0.92 percent of the workforce have never even received formal education (BPS, 2024). This situation shows that the proportion of middle and high-skilled workers in Indonesia only reaches 39.57 percent, much lower compared to other ASEAN countries such as Malaysia and Singapore.

Based on the 2017 Global Human Capital Index by the World Economic Forum (WEF), Indonesia is ranked 65th out of 130 countries, lagging Malaysia (ranked 33), Thailand (ranked 40), and Vietnam (ranked 64). Although Indonesia's labor productivity increased from 81.9 million rupiah per person in 2017 to 84.07 million rupiah per person in 2018, the contribution of Total Factor Productivity (TFP) to GDP growth was only 0.6 percent

(Bappenas, 2020). This factor indicates an urgent need to improve the quality and competitiveness of the workforce through an effective human resource (HR) development strategy.

One approach that has been proven effective in improving workforce competency is workplace learning (WPL) (Wardhana et al., 2023). This method allows employees to integrate practical experience with theoretical knowledge (Wardhana et al., 2023). Through the adoption of the IQF, WPL can be aligned with the needs of the global industry, thereby creating a competitive and adaptive workforce (Wardhana et al., 2023; Surono & Anggraini, 2024). The IQF serves as a competency qualification grading framework that provides recognition of learning achievements obtained through formal education, job training, and work experience (Ahid & Chamid, 2021).

However, the implementation of WPL in Indonesia faces various challenges. One of the main obstacles is the lack of management involvement in supporting the WPL program, which can hinder its effectiveness (Foley et al., 2021). In addition, limited training infrastructure and company resources are also obstacles to the optimal implementation of the WPL program (Rassameethes et al., 2021). The gap between the IQF curriculum and specific industry needs often makes the training provided less relevant to the reality of work (Mills et al., 2021; Siadaty, 2016). Therefore, a model is needed that can integrate industry needs with national standards through a strategic WPL-based approach, to improve the quality and competitiveness of the Indonesian workforce in the global market (Mackenzie et al., 2019; Margaryan, 2013).

Previous studies have highlighted the importance of workforce competitiveness and the role of HR development in improving industrial productivity. However, literature discussing the integration of WPL with the IQF is still limited (Wardhana et al., 2023; Wardhana & Pudjiati, 2024). Most studies tend to focus on formal learning without considering workplace learning as a key strategy (Jeong et al., 2018). Particularly in Indonesia, has paid limited attention to the integration of WPL with IQF, despite the potential for WPL to be recognized alongside formal education and job training. In addition, there is a significant research gap on how the WPL model can be effectively implemented in the Indonesian industrial context (Santoro, 2022).

This study aims to develop a WPL model integrated with IQF to improve the quality of the workforce in the Indonesian industrial sector based on the phenomena and facts of workplace learning practices using the grounded theory method. The results of the study are expected to provide strategic guidance for the development of more effective workplace learning. In addition, this study also contributes as a reference for industrial and government policies in improving the competitiveness of the workforce. Thus, this study is not only relevant to enriching the references for integrating WPL with IQF which are still few in the academic world, but also has a direct impact on industrial practices.

2. METHOD

This research uses qualitative grounded theory method to understand the practice of WPL based on the IQF in improving the competitiveness of industrial human resources in Indonesia. This approach was chosen for its ability to generate theoretical models relevant to specific contexts through analysis of empirical data (Warhurst, 2013). The research involved four main stages: data collection and data organization, data coding and analysis, theoretical model building and saturation testing, and research output (Rassameethes et al., 2021) as illustrated in figure 1. By using grounded theory, this research is expected to provide in-depth insights into how WPL can be integrated with IQF to improve the quality of the workforce in the industrial sector, as well as provide strategic guidance for the development of more effective workplace learning (Dornan, 2012).
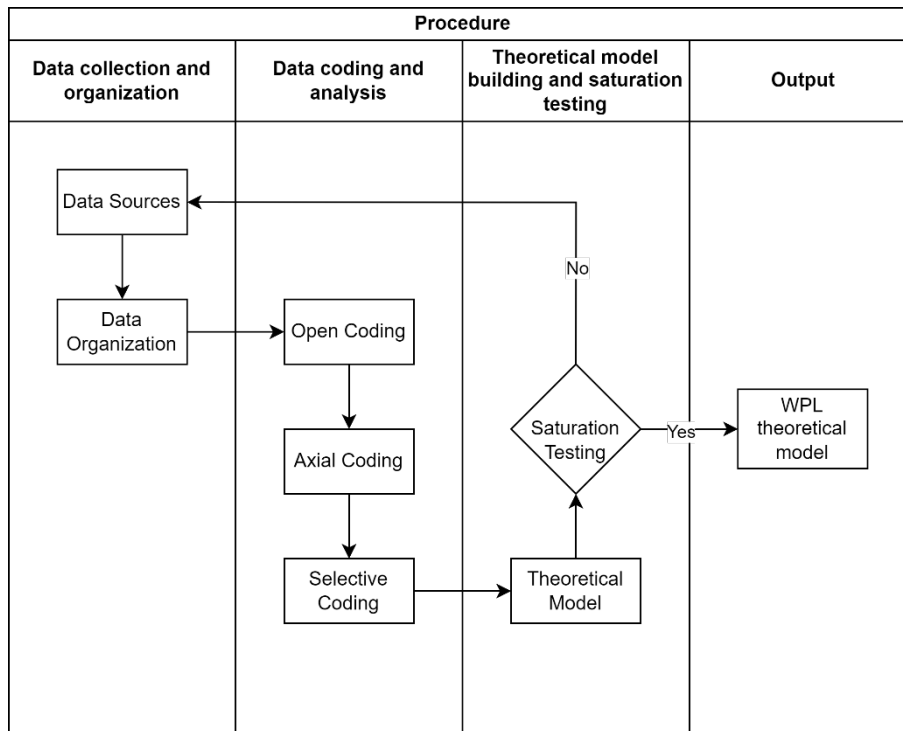
Figure 1 Flowchart of grounded theory in this research

Data collection in this study was conducted through documents relevant to the practice of WPL in state-owned companies engaged in the fertilizer industry. The main data sources include company annual reports, official publications, as well as other publicly available documents that support the understanding of the implementation of WPL based on IQF (Azwar et al., 2021; Fu et al., 2023). Data organization was done by classifying documents into two main categories: reference documents that included literature related to WPL and IQF, and company documents that contained specific data on WPL practices and policies (Marzuki et al., 2021). The classified data were then processed using the NVivo 12 application to facilitate organization, analysis, and pattern identification (Maher et al., 2018). This process ensures that the data used in the research is well structured, supports the accuracy of the analysis, and provides a strong foundation for the development of theoretical models (Fajri et al., 2020).

The coding process and data analysis in this study were conducted through three main stages: open coding, axial coding, and selective coding. In the open coding stage, researchers analyzed the data in detail by breaking it down into categories of basic concepts relevant to WPL practices and the principles of the IQF (Maher et al., 2018). The researcher remained open to the possibility of new concepts that had not been previously identified. Furthermore, at the axial coding stage, the categories that emerged from open coding were connected to find relationships and patterns between concepts, which helped in identifying key elements underlying the implementation of WPL, such as learning strategies, management involvement, and relevance to the IQF (Marzuki et al., 2021). The final stage was selective coding, where core categories were selected to form a theory or model explaining the practice of IQF-based WPL. At this stage, all related categories were connected to build a coherent theoretical narrative, which then became the basis for model development in this study (Fajri et al., 2020). This process ensures that data analysis is conducted systematically and in depth, supporting the accuracy and validity of the research results (Daugaard, 2020).

The construction of the theoretical model in this study was done by visualizing the inter-category relationships resulting from the selective coding stage. The model was designed to reflect WPL practices that are in line with the IQF standards, including the key of elements (Maher et al., 2018). This theoretical model describes the interaction between these factors, providing a holistic view of how WPL can be integrated with IQF to improve workforce competitiveness (Fajri et al., 2020). Once the theoretical model was developed, saturation testing was conducted to ensure its validity. This process involves repeating data collection and analysis until no new categories or themes emerge (Marzuki et al., 2021). The saturation test ensured that the data had reached a point of saturation, providing confidence that the resulting model covered all important aspects of IQF-based WPL practices relevant to the research context (Daugaard, 2020). This ensures the accuracy and completeness of the model as an applicable theoretical guide.

Finally, the output of this research is a theoretical model of WPL based on the IQF designed to improve the competitiveness of human resources in industry. It is expected that this theoretical model will not only provide guidance for the practice of WPL, but also serve as input for industrial and government policies in HRD.

3. RESULT AND DISCUSSION

Data overview

The data collected were sourced from the official websites of the companies (C1 to C8), including annual reports, sustainability reports, news articles, and magazines. All this data is organized in Table 1, focusing on relevant information regarding workplace learning practices. This data provides a comprehensive view of the implementation of WPL within the company context.

Table 1. Data collection

Companies	Annual reports	Sustainability reports	News articles	Magazines
C1	5	5	-	4
C2	5	-	-	-
C3	3	-	4	-
C4	5	4	12	-
C5	5	5	2	-
C6	5	5	78	5
C7	4	4	-	5
C8	5	5	33	-

Open coding

In the open coding stage, the word frequency feature in NVivo was used to identify the fifty most relevant keywords from the data documents. These keywords were utilized to guide the search and coding within the documents, helping the researchers identify key concepts related to WPL and IQF. This process aimed to establish the initial codes that would be used in further analysis, as illustrated in Figure 2.
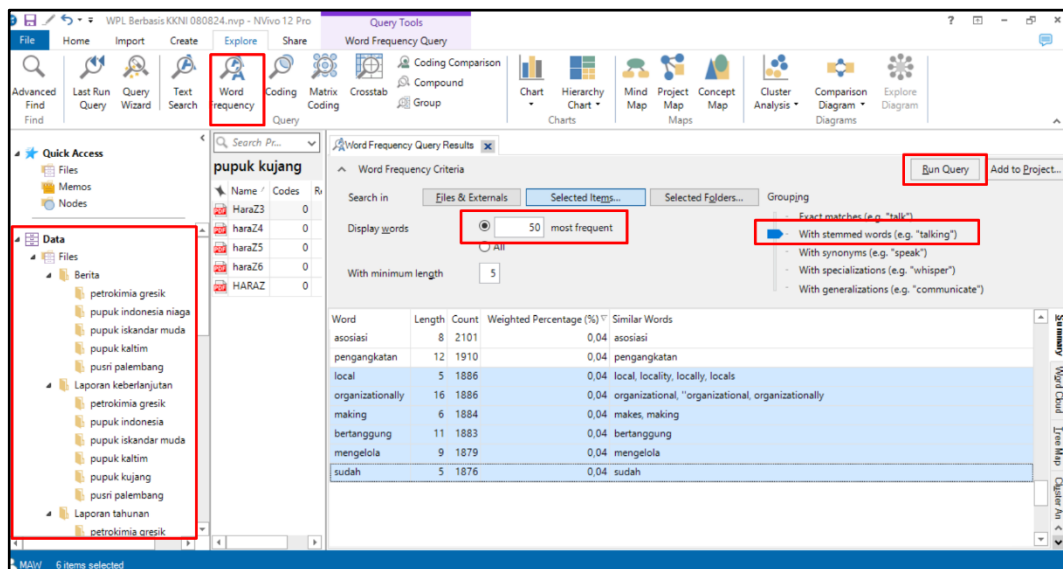

Figure 2. Word frequency

After determining the fifty relevant keywords through the saturation process, the next step was to search for meaningful sentences in the documents using each of these keywords. The meaningful sentences identified were then further refined through an additional saturation process and used as codes in the open coding stage. From this search, key categories related to WPL and IQF were identified, as shown in Table 2.

Table 2. Open coding stage code

Name	Files	References	Name	Files	References
Assignment	1	2	Job level	1	4
Career Planning	1	1	Learning quality	2	2
Certification	6	8	Managerial support	10	20
Coaching and counseling	2	2	Mentoring	1	1
Competency	6	12	On the job training	1	1
Competitiveness	3	5	Partnerships	4	9
Course	1	1	Performance	4	6
Discussion	1	3	Pre-retirement program	1	3
Education	6	10	Recruitment	4	5
Employee composition	2	2	Remuneration	1	1
Employee rotation and mutation	1	1	Research	4	4
Employee status	1	1	Scholarships	3	3
Experiential learning	10	13	Seminar	1	1
Experts quality	2	3	Sharing knowledge	6	7
Further education tasks	2	2	Standard	1	1
Gender	2	3	Structured training	10	18
HR planning	2	4	Superior HR	3	8
Industrial work practices	3	3	Talent management	5	5
Innovation	2	2	Technology	3	5
Internship	6	7	Working weight	1	1
Involvement in activities	8	9	Workshop	1	1

Table 2 presented records of various codes that emerged from the data, including the number of files and references associated with each category. Some of the identified codes include managerial support, experiential learning, and structured training, with each category showing a varying number of files and references. Managerial support was recorded in 10 files with 20 references, while structured training was found in 10 files with 18 references. This table illustrates the distribution of codes in the analysis and provides an overview of the topics that emerged from the data, which were used to deepen the axial coding analysis in this study.

Table 3. Initial categories formed by open coding

Codes	Initial categories
Education, Experts quality, Learning quality, Scholarships	Learning Environments
Structured training, Involvement in activities, Seminar, Workshop, Further education tasks, Course	Formal Learning
Coaching and counseling, On the job training, Discussion, Mentoring	Informal Learning
Experiential learning, Internship, Employee rotation and mutation, Industrial work practices	Experiential Learning
Structured trainings, Certification, Seminar, Course, Scholarships	Certification Process
Managerial support, Pre-retirement program, Recruitment, HR planning, Career Planning	Managerial Support
Employee composition, Research, HR planning, Standard	Conformance to Industry Standards

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Codes	Initial categories
Competency, Superior HR, Competitiveness, Talent management	Competencies and Skills
Innovation, Technology	Innovation and Adaptation
Partnerships, Employee status, Gender, Performance, Job level, Sharing knowledge	Employee Engagement
Assignment, Working weight, Remuneration	Task and Workload Management

The results of the open coding analysis show that WPL can be categorized into eleven main elements. These elements reflect the deep need to integrate formal, informal and experiential learning to create a competent workforce that meets industry needs. Categories such as Learning Environments, Formal Learning and Experiential Learning underscore the importance of diverse learning approaches in building technical skills. Meanwhile, categories such as Managerial Support and Certification Process show that strategic management and relevant certifications play an important role in ensuring successful WPL implementation. In addition, dimensions such as Innovation and Adaptation and Employee Engagement highlight the importance of flexibility and employee engagement in responding to industry dynamics. These results illustrate that effective human capital development requires synergy between learning and organizational management elements to create workforce competitiveness.

Based on Table 3, the codes were organized and grouped into categories, ensuring consistency and relevance in the relationships between categories and subcategories. To further validate this, cluster analysis and Pearson correlation calculations on word similarity in NVivo were utilized to understand the relationships between categories and subcategories, as shown in Table 4.

Table 4 Open Coding Matrix Based on NVivo Cluster Analysis

Categories	Sub-categories/Items (Pearson Correlation)
Category 1: Learning Environments	Education (0,820), Experts quality (0,648), Learning quality (0,756), Scholarships (0,689)
Category 2: Formal Learning	Structured training (0,936), Involvement in activities (0,814), Seminar (0,717), Workshop (0,717), Further education tasks (0,666), Course (0,268)
Category 3: Informal Learning	Coaching and counseling (0,824), On the job training (0,713), Discussion (0,161), Mentoring (0,137)
Category 4: Experiential Learning	Experiential learning (0,901), Internship (0,830), Employee rotation and mutation (0,568), Industrial work practices (0,559)
Category 5: Certification Process	Structured trainings (0,940), Certification (0,863), Seminar (0,686), Course (0,393), Scholarships (0,319)
Category 6: Managerial Support	Managerial support (0,959), Pre-retirement program (0,807), Recruitment (0,638), HR planning (0,383), Career Planning (0,127)
Category 7: Conformance to Industry Standards	Employee composition (0,730), Research (0,512), HR planning (0,448), Standard (0,447)
Category 8: Competencies and Skills	Competency (0,877), Superior HR (0,725), Competitiveness (0,643), Talent management (0,608)
Category 9: Innovation and Adaptation	Innovation (0,567), Technology (0,509)

Categories	Sub-categories/Items (Pearson Correlation)
Category 10: Employee Engagement	Partnerships (0,791), Employee status (0,641), Gender (0,591), Performance (0,591), Job level (0,554), Sharing knowledge (0,518)
Category 11: Task and Workload Management	Assignment (0,865), Working weight (0,276), Remuneration (0,019)

Based on Table 4, the relationships between categories and subcategories through Pearson correlation coefficients reveal several important findings. In the Learning Environments category, the subcategory Education shows the highest correlation (0.820), followed by Learning quality (0.756), Scholarships (0.689), and Experts quality (0.648). In the Formal Learning category, Structured training exhibits a very high correlation (0.936), followed by Involvement in activities (0.814), while both Seminar and Workshop share the same correlation (0.717). In the Informal Learning category, Coaching and counselling has the highest correlation (0.824), while Discussion and Mentoring show lower correlations of 0.161 and 0.137, respectively. In the Experiential Learning category, Experiential learning (0.901) and Internship (0.830) demonstrate very strong correlations. In the Certification Process category, Structured training (0.940) and Certification (0.863) exhibit strong relationships. The Managerial Support category is dominated by Managerial support (0.959), followed by Pre-retirement program (0.807). In the Conformance to Industry Standards category, Employee composition shows the highest correlation (0.730). The Competencies and Skills category is led by Competency (0.877), while Innovation and Adaptation shows a moderate correlation for Innovation (0.567). Finally, in the Employee Engagement category, Partnerships holds the highest correlation (0.791), and in the Task and Workload Management category, Assignment shows a strong correlation (0.865).

Axial coding

Table 5 Main categories formed by axial coding

Categories	Main categories
Formal Learning, Experiential Learning, Informal Learning, Learning Environments	Learning
Managerial Support, Certification Process, Conformance to Industry Standards	Certification
Competencies and Skills, Employee Engagement, Task and Workload Management, Innovation and Adaptation	Competitiveness

The axial coding analysis resulted in three main categories, namely Learning, Certification and Competitiveness, which were formed from several initial connotations. The Learning category includes elements of formal learning, experiential learning, informal learning, and learning environments, which together reflect an integrated comprehensive learning approach to improving workforce competencies. Certification includes managerial support, certification process, and conformance to industry standards, demonstrating the importance of validating competencies through formal, recognized processes. Meanwhile, Competitiveness comprises competencies and skills, employee engagement, task and workload management, and innovation and adaptation, highlighting the key elements that support workforce competitiveness in the face of industry dynamics. These results reflect the synergy between learning, certification and competitiveness as a strategic foundation in creating a workforce that is competent and relevant to global industry needs.

Based on Table 5, the categories were organized and grouped into concepts by considering the consistency and relevance of the relationships between each category and main category. To further validate this, cluster analysis and Pearson correlation calculations on word similarity in NVivo were employed again to understand the relationships between concepts and categories, as shown in Table 6.

Table 6 Axial Coding Matrix Based on NVivo Cluster Analysis

Main categories	Categories/Concepts (Pearson Correlation)
Learning	Formal Learning (0,909), Experiential Learning (0,844), Informal Learning (0,788), Learning Environments (0,768)
Certification	Managerial Support (0,959), Certification Process (0,924), Conformance to Industry Standards (0,697)
Competitiveness	Competencies and Skills (0,936), Employee Engagement (0,935), Task and Workload Management (0,624), Innovation and Adaptation (0,523)

Based on Table 6, the relationships between main categories and categories through Pearson correlation coefficients reveal several strong correlations. Category Learning has the highest correlation with Formal Learning (0.909), followed by Experiential Learning (0.844), Informal Learning (0.788), and Learning Environments (0.768), indicating a strong interconnection between various forms of learning. Category Certification shows a very strong correlation with Managerial Support (0.959) and Certification Process (0.924), while Conformance to Industry Standards has a more moderate correlation (0.697). Category Competitiveness demonstrates high correlations with Competencies and Skills (0.936) and Employee Engagement (0.935), while Task and Workload Management (0.624) and Innovation and Adaptation (0.523) exhibit moderate correlations.

Selective coding

Table 7 Concept formed by selective coding

Main categories	Concept
Learning, Competitiveness, Certification	Competitiveness of Indonesian Industry Human Resources

Based on Table 7, the categories were organized and grouped into concept by considering the consistency and relevance of the relationships between each concept and category. To further validate this, cluster analysis and Pearson correlation calculations on word similarity in NVivo were employed again to understand the relationships between concept and categories, as shown in Table 8.

Table 8 Selective Coding Matrix Based on NVivo Cluster Analysis

Concept	Categories/Concepts (Pearson Correlation)
Competitiveness of Indonesian Industry Human Resources	Learning (0,976), Competitiveness (0,955), Certification (0,942)

Based on Table 8, concept Competitiveness of Indonesian Industry Human Resources shows very strong correlations with Learning (0.976), Competitiveness (0.955), and Certification (0.942), highlighting that learning, competitiveness, and certification play key roles in enhancing the competitiveness of human resources in Indonesia's industry.

WPL Theoretical Model

Figure 3 illustrates the concept map for enhancing the competitiveness of Indonesia's industrial human resources, with three main concepts: Learning, Certification, and Competitiveness. This model demonstrates the synergy between learning, certification, and competencies to improve industrial competitiveness.
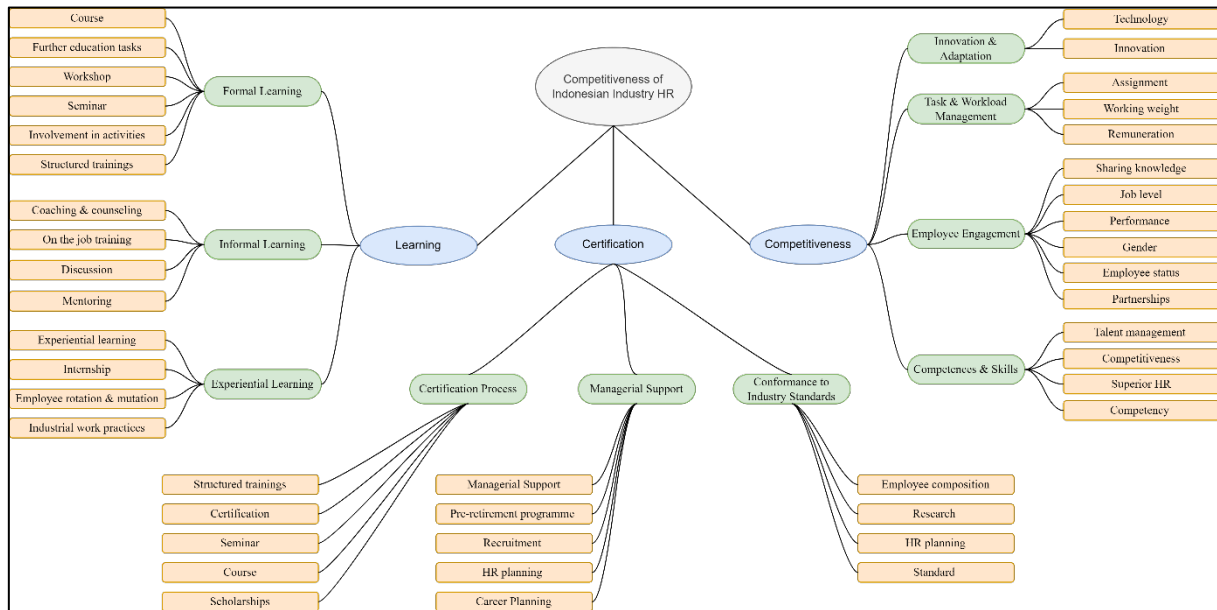
Figure 3 Concept Map for Improving the Competitiveness of Indonesian Industrial HR

Discussion

This research reveals that the integration of various learning methods-formal, informal and experiential-supported by good certification and management processes has a significant impact in improving the competitiveness of the industrial workforce in Indonesia. Factors such as structured training, mentoring programs, and job rotation contribute greatly to improving workforce competencies. In addition, certification accompanied by managerial support, such as career planning and competency-based recruitment, is a key element in ensuring workforce conformance to industry standards. This model not only emphasizes the importance of individual learning, but also underscores the role of the organization in creating a learning ecosystem that supports innovation and active employee engagement.

This research is closely related to previous studies that highlight the importance of experiential learning, such as internships and on-the-job training, in improving workforce competencies. For example, some previous studies emphasize that experiential learning has a positive impact on employees' acquisition of practical skills and adaptation to industry needs (Billett, 2015; Lemmetty & Billet, 2023). However, this study goes a step further by integrating formal and informal learning, often only partially addressed in other studies, into a comprehensive IQF-based model (Forssberg et al., 2020; Wardhana et al., 2023; Wardhana & Pudjiati, 2024). Certification has also been widely discussed as a tool to enhance workforce credibility, but this study demonstrates the advantages of including managerial support, such as career planning and competency-based recruitment, as a strategic element in the WPL model (Griffin, 2011). In addition, this research reinforces the literature discussing the importance of innovation and adaptation in improving workforce competitiveness but provides uniqueness by focusing on the collaboration of learning elements tailored to national standards and industry needs (Choi & Ko, 2020; Kim et al., 2022).

The results of this study reflect the importance of a holistic approach to HRD in Indonesian industry, particularly through the integration of IQF-based WPL. This model shows that collaboration between formal, informal and experiential learning, supported by certification and strategic management, can significantly improve workforce competitiveness (Matsuo, 2015). This reflection is an indicator that the research objective of developing a relevant and applicable learning model has been achieved. This model is not only useful in building the technical competence of the workforce, but also supports the strengthening of soft skills such as adaptation to technological change and active involvement in innovation. Furthermore, this research provides strategic benefits for companies in creating a competitive workforce in the global market, as well as for the government in supporting policies to improve the quality of national human resources. As such, the model serves as a practical guide to achieve the long-term goal of improving labor competitiveness in Indonesia.

The results of this study have significant strategic implications for the development of policies and practices in human resource management (HRM). For companies, the developed IQF-based WPL model can serve as a guide to develop more effective learning programs, especially in aligning industry needs with workforce competencies. These implications include optimizing experience-based training, strengthening certification

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integrated with national standards, and managing resources more efficiently through managerial support. In addition, for the government, this research provides a basis for designing more structured HRD policies, such as strengthening IQF-based certification regulations and incentives for companies that adopt integrated learning programs. The results of this study are also relevant to address the challenges of globalization, where the Indonesian workforce is required to be not only technically competent but also able to adapt to the changing needs of the international industry. Thus, this research provides practical and strategic contributions to improve the competitiveness of Indonesian labor in the global market.

The results of this research emerge due to a combination of key factors that synergistically influence the successful implementation of IQF-based WPL. First, formal, informal and experiential learning make complementary contributions to building workforce competencies. Formal learning, such as structured training and seminars, provides a strong theoretical foundation, while informal learning, such as mentoring and on-the-job training, enables direct knowledge transfer in the work environment. On the other hand, experiential learning, such as job rotations and industrial practice, enriches employees' experience with real challenges in the field. Second, targeted managerial support, including career planning and competency-based recruitment, plays an important role in ensuring that this learning is integrated with the company's strategic needs. Thirdly, the relevance of certification to industry standards is an amplifying factor that links individual competencies to labor market requirements. Therefore, the results of this study reflect how these elements work together to create a learning model that is not only compliant with national standards but also relevant to future industry needs.

Based on the results of this study, there are several strategic actions that need to be taken to ensure effective implementation of the IQF-based WPL model. Companies need to prioritize the development of an integrated learning program that includes formal, informal and experiential learning. This includes increasing access to structured training, mentoring programs, and job rotation opportunities relevant to industry needs. In addition, managerial support should be strengthened through internal policies, such as the development of career planning systems, competency-based recruitment and consistent performance evaluation. The government also has an important role to play by providing regulations that encourage companies to adopt this WPL model, including fiscal incentives for companies committed to IQF-based HRD. At the national level, it is necessary to develop certification standards that are more flexible but still in accordance with the needs of the global industry. Collaboration between companies, government and training institutions is also needed to create a learning ecosystem that supports innovation and workforce competitiveness. These actions not only support the implementation of the resulting model, but also ensure the sustainability of Indonesia's labor competitiveness in the global market.

Comparative Analysis of IQF-Based WPL with International Qualification Frameworks

The development of WPL models aligned with national qualification frameworks has gained significant attention globally as a strategic initiative to enhance workforce competencies and competitiveness (Wardhana et al., 2023). In Indonesia, the integration of the IQF within WPL initiatives serves as a bridge to close the skills gap and align educational outcomes with industry needs (Wardhana et al., 2023). However, to contextualize the global relevance of this model, a comparative analysis with qualification frameworks from other nations such as the Australian Qualifications Framework (AQF), the European Qualifications Framework (EQF), and the National Qualifications Framework (NQF) of South Africa provides critical insights (Al-Haqan et al., 2021).

The AQF emphasizes competency-based education, offering flexibility in learning pathways and recognition of prior learning, akin to the IQF (Laundon et al., 2023). One notable distinction lies in the robust incorporation of vocational education and training (VET) at multiple levels within the AQF, facilitating seamless transitions between academic and vocational sectors (Billett et al., 2020). Similarly, the EQF adopts a level-based structure that ensures cross-border recognition of skills and qualifications, a feature that underscores the mobility of workers within the European Union (Gutfleisch & Samuel, 2022; Leslie et al., 2023; Sehlbach et al., 2018). South Africa's NQF, like the IQF, prioritizes inclusivity by integrating formal, informal, and experiential learning (Jooste & Hagenmeier, 2022). However, South Africa's emphasis on redressing historical inequalities through education provides a unique social dimension to its qualification framework (Chasi, 2021; Tamin et al., 2019).

These comparisons highlight the potential for Indonesia to adapt elements of international frameworks, such as the AQF's focus on VET integration and the EQF's cross-border recognition mechanisms. Such adaptations could enhance the international competitiveness of Indonesian human resources, fostering greater alignment with global labor market standards.

Expanding the Concept of WPL in Developing Countries

The applicability of the IQF-based WPL model extends beyond Indonesia, holding significant promise for other developing nations grappling with similar workforce development challenges (Khandakar & Pangil, 2019; Lee et al., 2022; Murphy et al., 2021). Countries within the ASEAN region, Africa, and Latin America share common structural barriers, including limited access to formal education, skills mismatches, and underutilization of experiential learning (Condé et al., 2022; JEE et al., 2024; MacKechnie et al., 2021). By implementing WPL

models aligned with national qualification frameworks, these nations can promote inclusive economic growth and address the urgent need for a skilled workforce.

For instance, the adoption of competency-based training and certification in Brazil and the Philippines has demonstrated positive outcomes in enhancing workforce employability (Cabatan et al., 2021; Carlo & Dwyer, 2018; Carvalho et al., 2021). The Technical Education and Skills Development Authority (TESDA) in the Philippines mirrors Indonesia's IQF by recognizing and certifying skills acquired through non-formal education and on-the-job experience. Brazil's National Service for Industrial Training (SENAI) leverages competency-based curricula to drive workforce competitiveness, reflecting similar principles embedded within Indonesia's WPL model.

The expansion of WPL in developing countries necessitates strong public-private partnerships, the establishment of clear competency standards, and continuous engagement with industry stakeholders (Desfonteines et al., 2021). Additionally, leveraging digital learning platforms can facilitate the widespread dissemination of WPL initiatives, overcoming geographical and infrastructural limitations (Yekimov et al., 2023).

Model Limitations and Sector-Specific Relevance

While the IQF-based WPL model demonstrates considerable strengths, it is essential to acknowledge its limitations to ensure a balanced and comprehensive discussion. One primary limitation lies in the model's applicability across diverse industrial sectors. The model's design, which heavily draws from structured industries such as manufacturing and services, may not fully capture the nuances of sectors characterized by informal labor, creative industries, or rapidly evolving technological domains (Mulyani et al., 2023; Suntana & Priatna, 2023).

Furthermore, the scalability of the WPL model in small and medium-sized enterprises (SMEs) presents a significant challenge. SMEs often lack the financial and infrastructural capacity to implement comprehensive WPL programs, limiting the model's reach (Mendo et al., 2021; Šori et al., 2020). Addressing this limitation requires targeted policy interventions, including subsidies, technical assistance, and incentives to encourage SME participation in WPL initiatives (Miočević & Srhoj, 2023; Mohiuddin et al., 2023).

Another critical limitation involves the alignment of certification processes with international standards (Ikram et al., 2021). Although the IQF offers a robust framework for national recognition, discrepancies in competency definitions and assessment methods may hinder the global portability of Indonesian qualifications (Allais, 2010). Establishing mutual recognition agreements (MRAs) with international bodies and aligning competency standards with global benchmarks are essential steps to mitigate this limitation (De Brito et al., 2016; Sihombing, 2024).

Finally, the model's reliance on managerial support and institutional commitment poses potential risks in industries where leadership buy-in is limited. Overcoming this barrier necessitates awareness campaigns and advocacy efforts to underscore the long-term benefits of WPL for organizational productivity and workforce development (Yoon et al., 2018).

4. CONCLUSION

This research has produced a WPL model based on the IQF which aims to improve the competitiveness of human resources (HR) in the Indonesian industrial sector. The resulting model offers integration between formal, informal, and experience-based learning as a holistic approach in developing workforce competencies. The main novelty of this research lies in the integration of these three learning elements which are designed to align industry needs with national and global standards. This is a solution to the workforce competency gap which has been a challenge in facing global competition and the Industrial Revolution 4.0 era.

Specifically, the novelty resulting from this research can be identified in three main aspects:
1. Integrative Model of Experience-Based Learning
   This model combines experiential learning such as job rotation and industry practice with formal (structured training) and informal (guidance and mentoring) learning. This integration not only enriches the workforce experience but also creates an adaptive and sustainable learning ecosystem.
2. IQF-Based Certification Integrated with Industry Needs
   The certification process in this model is designed to align with IQF standards and industry-specific needs. This approach ensures that the workforce has nationally and internationally recognized qualifications, increasing workforce mobility and skill relevance across sectors.
3. Managerial Support and Competency-Based Career Planning
   This study highlights the importance of managerial support in the form of competency-based career planning and recruitment. The novelty lies in the active role of management in ensuring that learning programs run consistently and deliver results that are in line with industry needs.

Theoretical Implications

The findings of this study make a significant contribution to the academic literature in the field of HRD and workplace learning. The proposed model strengthens the experiential learning theory (Kolb, 1984 as cited by Chan, 2012; Konak et al., 2014; Raschick et al., 1998) by adapting these principles to the context of the Indonesian industry which has specific challenges and needs. In addition, this study broadens the scope of the IQF concept by integrating aspects of certification and recognition of informal learning, which have not been widely discussed in previous literature.

Another theoretical implication is the affirmation that HRD development can no longer be viewed as a separate entity from a company's business strategy. On the contrary, human resource development through WPL should be seen as a key factor in enhancing corporate competitiveness and supporting innovation. Thus, this study enriches the literature on the relationship between organizational learning, workforce competitiveness, and business strategy.

Practical Implications

From a practical perspective, this model provides guidance for companies in designing more effective and sustainable training programs. The government can also utilize these findings to formulate policies that encourage the widespread implementation of WPL in various industrial sectors. In addition, the results of this study are expected to be the basis for educational and training institutions in developing curricula that are more in line with industrial needs.

Overall, this study offers a real contribution in bridging the gap between the world of education and industry. This IQF-based WPL model is not only relevant in the national context but also has the potential to be adapted in various countries with similar conditions, making it an applicable and flexible model in facing the dynamics of the global labor market.

5. ACKNOWLEDGE

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