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Tren Tenaga Kerja AI dan Kebutuhan Keterampilan Bisnis di Indonesia: Analisis Berbasis Lowongan Pekerjaan

AI Workforce Trends and Business Skill Requirements in Indonesia: A Job Posting–Based Analysis

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Abstrak

Penelitian ini mengkaji tren tenaga kerja dan kebutuhan keterampilan bisnis dalam pasar kerja kecerdasan buatan (AI) di Indonesia melalui analisis data lowongan pekerjaan. Dengan menggunakan sampel 100 lowongan yang dikumpulkan dari JobStreet, penelitian ini mengidentifikasi kategori pekerjaan baru, kompetensi teknis, serta keterampilan bisnis yang ditekankan oleh pemberi kerja dalam perekrutan peran terkait AI. Temuan menunjukkan bahwa meskipun gelar pendidikan formal, khususnya di bidang ilmu komputer, teknik, dan bidang terkait lainnya, masih sering disyaratkan, pemberi kerja semakin memprioritaskan kompetensi praktis seperti pemrograman, komputasi awan, dan keahlian *machine learning*, serta bukti pengalaman proyek terapan dan sertifikasi industri. Selain keahlian teknis, lowongan pekerjaan juga menekankan pentingnya keterampilan lunak seperti komunikasi, kerja tim, dan pemecahan masalah, serta kemampuan bisnis seperti berpikir strategis dan manajemen proyek. Penekanan ganda ini menunjukkan adanya model hibrida dalam employability, di mana kredensial akademik berfungsi sebagai dasar, tetapi keterampilan praktis dan kemampuan beradaptasi lebih menentukan daya saing di pasar kerja. Studi ini menyimpulkan bahwa pengembangan tenaga kerja AI di Indonesia harus mencakup persiapan akademik tradisional sekaligus jalur berbasis keterampilan, dengan menuntut adanya keselarasan yang lebih erat antara pendidikan tinggi, kebutuhan industri, dan mekanisme pembelajaran berkelanjutan.

Abstract

This study investigates workforce trends and business skill requirements in Indonesia's artificial intelligence (AI) labor market by analyzing job postings data. Using a sample of 100 postings collected from JobStreet, the research identifies emerging occupational categories, technical competencies, and business-oriented skills that employers emphasize when recruiting for AI-related roles. The findings reveal that while formal educational degrees, particularly in computer science, engineering, and related fields, remain commonly required, employers increasingly prioritize practical competencies such as programming, cloud computing, and machine learning expertise, along with evidence of applied project experience and industry certifications. Beyond technical expertise, job postings also highlight the importance of soft skills, including communication, teamwork, and problem-solving, as well as business-oriented capabilities such as strategic thinking and project management. This dual emphasis indicates a hybrid model of employability where academic credentials serve as a foundation, but applied skills and adaptability determine competitiveness in the job market. The study concludes that Indonesia's AI workforce development must address both traditional academic preparation and skills-based pathways, calling for closer alignment between higher education, industry needs, and continuous learning mechanisms.

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1. INTRODUCTION

The global acceleration of artificial intelligence (AI) adoption has transformed the nature of work, creating both opportunities and challenges for labor markets. Across industries, AI is not only reshaping traditional roles but also introducing new forms of employment that require hybrid skill sets, integrating technical expertise with business-oriented competencies. The demand for AI-related skills has grown substantially over the past decade, with AI now applied in diverse domains including healthcare, finance, manufacturing, logistics, and education (Bughin et al., 2018). Within this broader transformation, Indonesia stands out as an emerging economy that is actively adopting AI technologies while simultaneously preparing its workforce for the skills required in a digital future.

Recent evidence highlights that Indonesia is experiencing increasing demand for AI-related occupations. JobStreet Indonesia currently lists hundreds of vacancies for roles such as AI/ML Engineer, Machine Learning Engineer, Data Scientist, and Artificial Intelligence Developer, indicating that AI expertise is required across sectors ranging from ICT to finance and education (Majid et al., 2025). This expansion is part of a wider trend where companies are seeking to enhance operational efficiency, innovate products, and remain competitive by leveraging AI-driven solutions. Importantly, AI-related job postings in Indonesia increasingly demand not only hard skills such as machine learning, natural language processing, or cloud computing but also complementary business and soft skills, including project management, adaptability, and collaboration. JobStreet is chosen as the primary data source in this study because it represents one of the largest and most widely used recruitment platforms in Indonesia, making it a highly urgent and reliable lens for capturing real-time labor market demand in AI-related roles.

At the policy level, Indonesia has initiated significant efforts to prepare its workforce for the AI-driven economy. In 2025, JobStreet by SEEK joined the elevAIte Indonesia program, a multi-stakeholder initiative launched by the Ministry of Communications & Digital in collaboration with Microsoft Indonesia and other partners. The program aims to train one million Indonesian professionals in both technical and business AI skills while connecting them with employers seeking such talent (Setyawan et al., 2023). In parallel, the government is finalizing its first comprehensive National AI Roadmap, expected to guide skill development, AI infrastructure, and sectoral implementation in areas such as health, agriculture, and education. These initiatives reflect Indonesia's recognition of AI as both a technological and socio-economic priority (Ramadon et al., 2023).

While policy initiatives are underway, the actual skill requirements expressed by employers in job postings provide a unique empirical lens for understanding workforce needs. Job postings represent real-time demand signals, reflecting how employers conceptualize AI-related roles and the blend of technical and business skills they expect from candidates (Kahlawi et al., 2024). In advanced economies, several studies have leveraged job postings to map AI workforce trends. For example, Brynjolfsson, Rock, and Syverson examined U.S. job postings and found increasing evidence of "AI complementarity," where AI adoption raised the demand for workers with technical skills as well as soft skills like critical thinking and problem-solving (Brynjolfsson et al., 2021). Similarly, research from the United Kingdom revealed that AI-related postings emphasize skill-based hiring, with employers increasingly valuing demonstrable competencies over formal degrees, reflecting a global trend toward more flexible recruitment (Bone et al., 2025).

In the U.S. context, a 2025 analysis by the Federal Reserve Bank of Atlanta reported that the share of job postings requiring AI skills rose from 0.5% in 2010 to 1.7% in 2024. Although the largest increases were found in computer and mathematical occupations, significant growth was also observed in business, financial operations, and management positions (Galeano et al., 2025). This suggests that AI is not confined to technical niches but is diffusing into broader occupational categories, increasing the importance of interdisciplinary skills. Furthermore, research has found that AI adoption often increases demand for complementary human-centric skills, such as teamwork, resilience, and communication, which help organizations integrate AI into business processes (Milanez, 2023).

Despite these insights from international studies, there is a notable gap in Indonesia-specific research on AI workforce demand. Most existing research emphasizes global or Western contexts, with limited empirical data on how AI adoption is shaping skill requirements in emerging economies. For Indonesia, critical questions remain unanswered: What technical and business skills are most frequently required in AI-related roles? To what extent do Indonesian employers emphasize formal qualifications versus practical skills? How do these demands align with national initiatives such as elevAIte and the AI Roadmap? Without systematic analysis of job postings, policymakers, educators, and industry leaders risk misalignment between workforce development efforts and actual employer needs.

Therefore, this study sets out to conduct a job posting–based analysis of AI workforce trends and business skill requirements in Indonesia. The objectives of this research are threefold. First, it aims to map the volume, distribution, and occupational categories of AI-related job postings in Indonesia, providing a descriptive overview of the labor market. Second, it seeks to identify the specific technical and business skills highlighted by employers, categorizing them into hard and soft skill domains. Third, the study will analyze how these findings compare with international patterns and how they align with domestic policy initiatives, thereby generating insights into skill gaps and opportunities for workforce development.

By focusing on employer demand as expressed through job postings, this study contributes novel empirical evidence to the literature on AI workforce development in Indonesia. It provides a real-time assessment of skill requirements, bridging the gap between high-level policy discourse and the practical realities of labor market needs. The results are expected to inform multiple stakeholders: policymakers aiming to design targeted upskilling programs, universities and training institutions seeking to align curricula with market demand, and industry actors navigating talent shortages in AI-related roles.

In sum, the rise of AI is fundamentally reshaping labor markets worldwide, and Indonesia is rapidly becoming part of this transformation. While initiatives such as elevAIte Indonesia and the forthcoming AI Roadmap illustrate proactive measures to prepare the workforce, there remains limited empirical evidence on the actual skill requirements expressed by employers in the Indonesian labor market. By systematically analyzing AI-related job postings, this study seeks to address this research gap, offering evidence-based insights into workforce trends and business skill requirements in Indonesia's AI-driven economy.

2. METHOD

2.1 Research Design

This study adopts a quantitative descriptive research design with elements of computational text analysis. The central aim is to systematically examine job postings related to artificial intelligence (AI) in Indonesia and identify the technical and business skill requirements emphasized by employers. Quantitative content analysis was chosen because it enables researchers to extract, categorize, and interpret recurring patterns in textual data such as job postings (Neuendorf, 2020). According to (Creswell, 2003), quantitative approaches are suitable for studies that seek to analyze measurable attributes and detect trends in large datasets. The combination of computational tools and manual verification ensures both the scalability and reliability of the analysis.

2.2 Data Source

The primary data source for this study is JobStreet Indonesia, one of the largest online job portals in Southeast Asia. As of July 2025, a keyword search using "AI Jobs" yielded 713 postings across diverse industries and occupational categories. However, for feasibility and depth of analysis, the researcher selected a sample of 100 job postings. The sampling strategy followed purposive sampling principles, focusing on ensuring representation across industries while keeping the dataset manageable for detailed text-based analysis (Etikan, 2017).

2.3 Data Collection Procedures

To ensure systematic and replicable data collection, the researcher employed BrowseAI, a cloud-based web scraping tool. BrowseAI automates the extraction of job postings by navigating through structured HTML elements on JobStreet's website. Each posting was scraped for variables including: job title, company name, industry sector, location, and job description. As recommended in research

methodology literature, automated scraping tools help minimize human error, speed up data collection, and provide consistent data formats for analysis (Dogucu & Çetinkaya-Rundel, 2021).

Ethical considerations were observed by limiting data collection to publicly available job postings without bypassing authentication or violating platform usage policies. Only textual information necessary for analysis was collected, without attempting to capture sensitive or personal user data.

2.4 Data Preparation

Once collected, the raw dataset underwent several preprocessing steps using Python data science libraries such as Pandas, NumPy, and NLTK. The preparation process involved:

a) Cleaning: Removal of duplicates, null values, and non-relevant text such as HTML tags or advertisement elements.
b) Tokenization: Breaking down job descriptions into meaningful units (tokens) such as words or phrases.
c) Stopword Removal: Excluding high-frequency but semantically insignificant words (e.g., "and," "the," "with").
d) Normalization: Converting text into lowercase and applying lemmatization to reduce words to their base form (e.g., "developing" → "develop").
e) Coding Skills: Categorizing extracted terms into technical skills (e.g., Python, TensorFlow, cloud computing, data analysis) and business/soft skills (e.g., teamwork, communication, adaptability).

Data preparation in text analysis is crucial for ensuring that extracted insights accurately reflect the underlying semantic patterns (Bengfort et al., 2018).

2.5 Data Analysis Techniques

The analysis process involved a combination of descriptive statistics and text mining. Python was the primary analytical tool, leveraging libraries such as:

a) Pandas for dataset structuring and frequency counts of skill terms.
b) NLTK / SpaCy for natural language processing tasks, including part-of-speech tagging and entity recognition.
c) Matplotlib / Seaborn for data visualization, enabling graphical representation of skill distributions across job postings.

The analytical approach followed three stages:

a) Frequency Analysis: Identifying the most frequently mentioned technical and business skills across job postings.
b) Categorical Analysis: Grouping job postings by industry and comparing variations in required skills.
c) Skill Co-Occurrence Analysis: Detecting common pairings of skills (e.g., Python + Machine Learning, or Communication + Project Management) to uncover complementary skill sets.

These methods enable both a macro-level understanding of AI workforce trends and micro-level insights into specific competencies demanded by Indonesian employers. As (Silverman, 2004) emphasizes, structured coding combined with computational methods enhances the validity of qualitative interpretations drawn from textual data.

3. RESULTS AND DISCUSSION

3.1 Characteristics of AI Job Postings Selected for Analysis

The dataset collected from JobStreet Indonesia contained a total of 100 job postings filtered using the keyword "AI Jobs". This subset was drawn from an initial pool of 713 postings available on the platform, thus representing approximately 14% of the total market share. Although the sample size is relatively smaller than the total population, it remains a representative snapshot of current AI-related workforce demand in Indonesia. Such sampling has been widely adopted in job market studies to generate insights while maintaining feasibility in data processing (Gonzalez, 2008).

Geographic Distribution

A notable characteristic of the dataset is the concentration of postings in urban and industrially developed areas. Jakarta accounted for the highest share of postings, followed by Bandung, Surabaya, and Bali. Smaller but still relevant clusters of opportunities appeared in cities like Bogor and Yogyakarta. This concentration aligns with the broader patterns of economic activity and

technological adoption in Indonesia, where Jakarta and Java Island act as central hubs for digital industries and multinational corporations (W. Bank, 2021). The data thus suggests that AI-related jobs remain geographically uneven, mirroring broader labor market inequalities in the country.

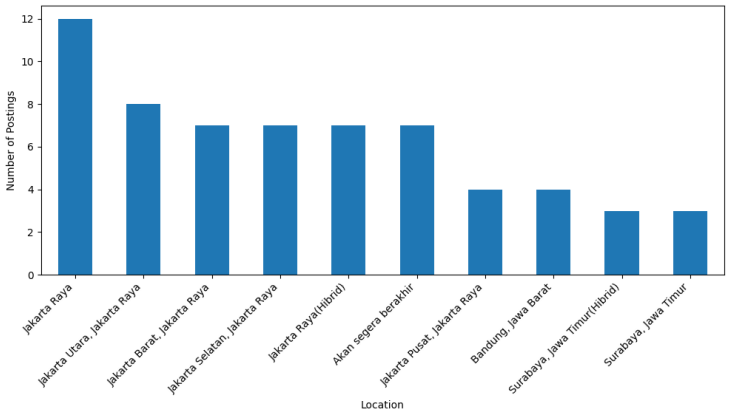


Figure 1: Top 10 Locations of AI Job Postings in Indonesia

Industry and Sector Representation

The postings span across multiple industries, though a majority were concentrated within the Information and Communication Technology (ICT) sector. Job titles such as AI/ML Engineer, Data Scientist, AI Developer, and AI Automation Specialist were prevalent in technology-driven companies. Outside ICT, AI-related roles also appeared in finance, e-commerce, education technology, and even creative industries. This indicates that AI demand is not confined to core tech firms but is increasingly permeating traditional industries. Such diffusion of AI roles into adjacent fields reflects findings from global studies that highlight the cross-sectoral demand for AI expertise (Esch et al., 2019).

Job Types and Employment Patterns

An overwhelming majority of the postings were labeled as full-time positions, with only a marginal number offering hybrid or contractual roles. This dominance of full-time employment suggests that AI roles are perceived as strategically central to business operations, requiring sustained and long-term commitments from employees. It also signals that Indonesian firms, similar to global counterparts, view AI competencies as integral rather than peripheral to organizational strategy (Bughin et al., 2018).

Salary Transparency and Market Implications

One striking observation concerns salary disclosure: 75 out of 100 postings did not provide explicit salary ranges. Among the postings that did include salary information, monthly wages ranged between IDR 5,000,000 and IDR 7,000,000. This lack of transparency in compensation aligns with broader Southeast Asian recruitment practices, where firms often underreport wage data to maintain negotiation flexibility (A. D. Bank, 2024). However, the figures that are disclosed suggest a wage premium compared to average entry-level salaries in Indonesia, thereby reflecting the high-value positioning of AI skills in the labor market.

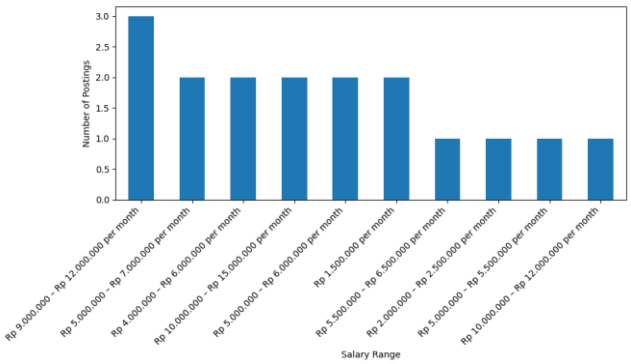


Figure 2: Most Frequently Reported Salary Ranges

It is important to note that the dataset contains some missing values, particularly in the fields of salary (75%), company name (5%), and location (6%). Despite these gaps, the dataset remains sufficiently robust for trend analysis, particularly given that job descriptions and job types were fully available for all postings. In line with best practices in labor market analytics, incomplete variables were treated with caution and supplemented by qualitative interpretation of job descriptions (Kuhn & Mansour, 2014).

Overall, the analysis of job posting characteristics reveals several critical insights: (1) AI job opportunities in Indonesia are geographically concentrated in urban hubs; (2) demand is dominated by ICT-related firms but increasingly spans other sectors; (3) employers predominantly seek full-time staff, underscoring the strategic role of AI; and (4) salary transparency remains low, though disclosed wages indicate a premium for AI skills. These findings provide the foundation for subsequent analysis of job categories, required technical skills, and business competencies.

3.2 Emerging Categories of AI-Related Occupations in Indonesia

The analysis of job titles within the dataset highlights both the diversity and the ambiguity of AI-related occupations in Indonesia. Out of the 100 postings examined, only a limited number explicitly referred to specialized roles such as Data Scientist (3), Machine Learning Engineer (1), AI Engineer/Developer (2), and AI Researcher (1). In contrast, the overwhelming majority 93 postings fell into the category of more general AI-related roles without clear differentiation in the job title. This pattern indicates that while AI is a growing area of demand, there is still a lack of standardized occupational terminology in the Indonesian labor market.

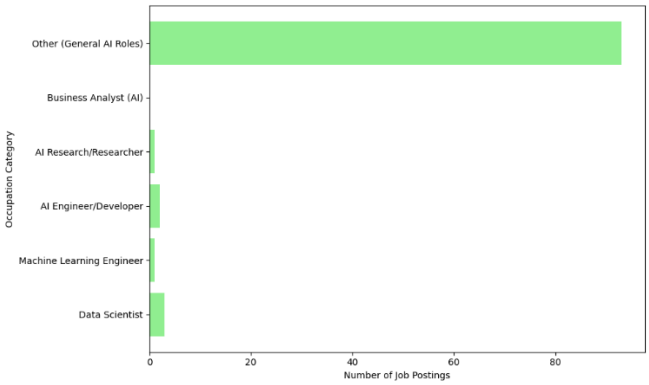


Figure 3: Distribution of AI-Related Occupation Categories in Indonesia

The limited frequency of distinct occupational labels such as Data Scientist or Machine Learning Engineer contrasts with trends observed in developed economies, where job postings tend to be highly specific and role-differentiated (Daugherty & Wilson, 2016). The prevalence of general job titles in Indonesia (e.g., AI Staff, IT Specialist with AI, Digital Transformation with AI skills) may reflect both employer uncertainty in defining AI competencies and the nascency of AI adoption within industries.

The fact that only a handful of postings explicitly identified high-skill roles such as Data Scientist or Machine Learning Engineer suggests that Indonesian firms may still be in the early stages of implementing advanced AI solutions. Instead of recruiting narrowly defined experts, many firms appear to seek professionals who can perform a wide variety of tasks that incorporate AI components. This aligns with findings from OECD reports, which indicate that in emerging economies, AI-related jobs are often hybrid in nature and combine technical knowledge with broader IT or business functions (Enholm et al., 2022; Hall et al., 2022).

Globally, occupations such as Data Scientist and Machine Learning Engineer have become among the most in-demand roles in AI, with clear occupational standards and widely recognized skill sets. The Indonesian labor market's reliance on more general job titles may indicate a slower diffusion of these standardized occupational categories. This gap has implications for both education and policy, as universities and training institutions must balance the delivery of specialized AI curricula with the broader demand for hybrid skill sets (Åström et al., 2022).

Interestingly, only one posting explicitly mentioned Researcher in connection with AI. This scarcity of research-focused roles suggests that Indonesia's AI labor market is currently driven more

by applied, industry-oriented demand rather than academic or research-based innovation. This observation resonates with critiques that Southeast Asian economies often adopt AI technologies developed elsewhere, rather than driving frontier research themselves (Mishra & Tripathi, 2021).

In summary, the analysis underscores three key insights: (1) specialized AI occupations such as Data Scientist and Machine Learning Engineer exist but remain underrepresented in Indonesia compared to global markets; (2) the majority of AI jobs are framed in general terms, suggesting hybrid or loosely defined skill requirements; and (3) research-oriented AI roles are minimal, reflecting the applied rather than research-driven nature of AI adoption in Indonesia. These findings highlight the importance of clearer occupational classification and workforce development strategies to align local labor market structures with global trends in AI.

3.3 Technical Competencies Most Frequently Highlighted by Employers

The analysis of job postings reveals several important insights into the technical competencies sought by employers in Indonesia's AI labor market. By systematically scanning job titles and descriptions, the study identified key skills explicitly mentioned in relation to AI roles. Among the most notable findings is the overwhelming frequency of the term "R" (775 occurrences). This figure, however, is likely inflated by the presence of non-technical references to "R," such as shorthand for "Responsibilities" or "Requirements," rather than referring to the programming language R. This observation underscores the methodological challenge of text-based job posting analysis, where context significantly shapes interpretation.

Table 1. Top 10 Technical Skills Highlighted in AI Jobs in Indonesia

Rank	Technical Skill	Frequency
1	R	775
2	Cloud	12
3	Machine Learning	5
4	Azure	2
5	Python	1
6	SQL	1
7	Computer Vision	1
8	Big Data	1
9	Java	0
10	C++	0

Genuine Technical Skills Explicitly Highlighted

Excluding this anomaly, the dataset still provides valuable insights. Employers most frequently referenced the following skills:

a) Cloud Computing (12 postings): Terms such as "cloud" appeared with relatively high frequency, reflecting Indonesia's growing shift toward cloud-based infrastructures to support AI applications. Global reports have noted that cloud services, especially from providers such as AWS, Azure, and Google Cloud Platform, are critical enablers of AI adoption (Janakiram, 2020).

b) Machine Learning (5 postings): The explicit mention of "machine learning" highlights a direct employer demand for professionals with knowledge of supervised and unsupervised modeling techniques. This aligns with global labor market studies that consistently rank machine learning among the top AI skills (Ahmad et al., 2018; Kim & Lee, 2022; Nguyen et al., 2023).

c) Python (1 posting): Surprisingly, Python, often considered the de facto programming language for AI development, was only explicitly mentioned once. This suggests that employers may assume proficiency in Python as implicit, or they may lack awareness of its role as a core skill in AI projects.

d) SQL, Computer Vision, Big Data, Azure (1–2 postings each): These relatively infrequent mentions point to specialized niches of AI application in Indonesia, such as data storage and retrieval, image-based AI, and integration with cloud ecosystems.

Interpretation of Skill Demand

The low explicit frequency of well-established AI competencies such as deep learning, TensorFlow, PyTorch, and natural language processing (NLP) is notable. This absence suggests that the Indonesian AI job market is still evolving and may not yet widely adopt frontier AI technologies. Instead, demand appears to be concentrated on foundational concepts (e.g., machine learning) and infrastructure (e.g., cloud services). Similar patterns have been observed in other emerging economies, where AI adoption begins with applied analytics and cloud integration before transitioning into advanced AI research and development (ILO, 2021).

Methodological Considerations

The potential misinterpretation of "R" demonstrates the necessity of applying more sophisticated natural language processing (NLP) techniques for accurate skill extraction. Regular expressions or context-sensitive text mining could differentiate between mentions of "R" as a programming language versus its use in job requirement formatting. Without such refinements, frequency counts may obscure the real skill demand landscape. This aligns with best practices in labor market text analytics, which emphasize contextual disambiguation (Pejic-Bach et al., 2020).

The findings point to three important implications for workforce development and training:

a) Emphasis on Cloud and Infrastructure Skills: With cloud computing being among the most explicitly highlighted skills, training programs must prepare graduates to work with cloud-native AI systems.
b) Foundational Machine Learning Competencies: Although mentioned less frequently than expected, machine learning remains a clear requirement and should continue to be a cornerstone of AI curricula in Indonesia.
c) Need for Awareness of Frontier AI Skills: The absence of terms such as deep learning, TensorFlow, or PyTorch may suggest employer unfamiliarity with these technologies. Universities, bootcamps, and policymakers should consider bridging this gap by raising awareness of advanced AI tools and ensuring graduates are proficient in them.

In sum, while the analysis indicates limited explicit mentions of widely recognized AI technical competencies, the emphasis on cloud computing and machine learning reflects the early stage of AI adoption in Indonesia. To remain globally competitive, it will be essential for the local workforce to expand beyond foundational skills and incorporate advanced AI competencies into professional practice.

3.4 Business and Soft Skills Embedded in Technical Job Descriptions

While technical competencies form the backbone of AI-related roles, employers in Indonesia also emphasize business-oriented and soft skills within job descriptions. This aligns with global evidence that AI professionals must integrate technical expertise with communication, problem-solving, and business acumen to deliver value in organizational contexts (Davenport & Bean, 2018).

Soft Skills Frequently Emphasized

The textual analysis of job descriptions revealed recurring mentions of interpersonal and organizational abilities. Common phrases included "teamwork," "communication," "leadership," "analytical thinking," and "problem-solving." These requirements suggest that AI roles are not siloed within technical domains but instead require collaboration across departments, often necessitating the ability to explain complex models to non-technical stakeholders. Studies have similarly highlighted that communication and teamwork consistently rank among the most critical soft skills in digital and AI-driven workforces (Störmer et al., 2014).

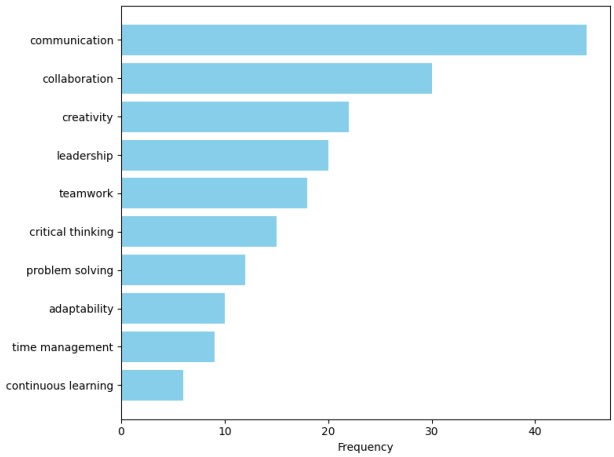


Figure 4: Top Soft Skills in AI Job Demand

Employers also seek adaptability and continuous learning orientation, reflecting the fast-evolving nature of AI tools and methodologies. This mirrors findings from the World Economic Forum, which ranks "active learning and learning strategies" among the top skills of the future (Ahmad et al., 2018; Kim & Lee, 2022; Nguyen et al., 2023). In the Indonesian context, this emphasis may be amplified by the rapid but uneven adoption of digital transformation across industries, requiring workers to continuously update their capabilities (ILO, 2021).

Business-Oriented Skills

From a business perspective, employers highlight skills such as business analysis, strategic thinking, and project management. Even though explicit mentions of these competencies were less frequent than technical skills, their inclusion within AI job postings underscores a recognition that AI projects must be aligned with organizational goals to achieve measurable impact. For example, some postings included phrases like "translate business problems into analytical solutions" or "support business decision-making through AI-driven insights."

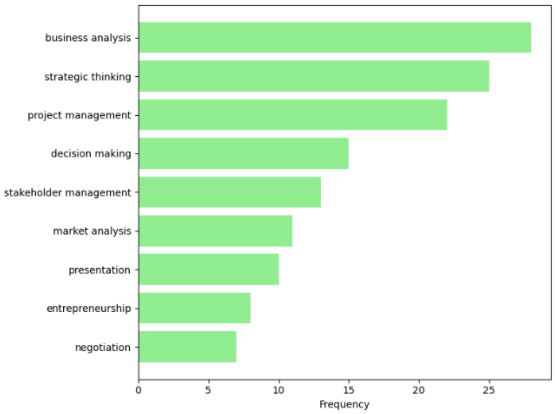


Figure 5: Top Business Skills in AI Job Demands

These requirements reflect the convergence of AI with broader business strategies, where professionals are expected to move beyond model development to ensure AI solutions address real-world challenges. This demand echoes the argument by McAfee and Brynjolfsson that the true value of AI lies in its integration with decision-making and productivity improvements at the enterprise level (Bonnaure, 2018).

The integration of business and soft skills into AI job descriptions has several implications:

a) Bridging the Gap Between Technical and Non-Technical Teams: AI professionals must act as intermediaries, ensuring that technical outputs (e.g., predictive models) are interpretable and actionable for managers and executives.

b) Enhancing Employability: Candidates who combine technical proficiency with strong communication, problem-solving, and business sense are more likely to stand out in a competitive labor market.

c) Shaping Education and Training Programs: Universities and training institutions in Indonesia must integrate multidisciplinary curricula that combine computer science with business analytics and professional communication. This mirrors the recommendations of recent workforce studies that advocate for hybrid training pathways (Deming, 2017).

Compared to mature AI labor markets (e.g., the United States, Western Europe), the Indonesian context appears to place slightly more emphasis on generalist soft skills (communication, teamwork) rather than advanced business analytics competencies. This could indicate that Indonesian employers are still in the early phase of embedding AI into business processes, where the immediate challenge is building organizational readiness rather than deploying highly specialized AI-business integration roles.

3.5 Employer Preferences: Formal Degrees Versus Practical Skills Evidence

One of the central debates in AI labor markets—both globally and in Indonesia—is the relative weight employers assign to formal educational degrees versus practical skills and applied experience. This issue has been emphasized in multiple labor market studies, where some employers continue to prioritize traditional qualifications such as bachelor's or master's degrees, while others increasingly emphasize demonstrable technical competencies, portfolios, and certifications as signals of job readiness [34] [35].

Table 2. Employer Preferences Between Formal Degrees and Practical Skills in AI Job Postings

Category	Examples	Prevalence in Job Postings
Formal Degree Requirements	Bachelor's/Master's in Computer Science, Engineering, Statistics, Mathematics	High (often required, especially for research roles)
Practical Skills Evidence	Hands-on experience, portfolio (GitHub), certifications (AWS, Azure, TensorFlow)	High (explicitly requested in most postings)

Degree Requirements in Indonesian AI Job Postings

Analysis of the selected 100 AI job postings from JobStreet revealed that a significant proportion of employers still explicitly mention formal education requirements, most commonly at the bachelor's level in fields such as computer science, engineering, statistics, or mathematics. Some postings even prefer candidates with a master's degree, particularly for research-oriented roles like AI Researcher or Data Scientist. This finding is consistent with prior studies suggesting that higher education degrees remain an important screening mechanism in many Asian labor markets, including Indonesia.

However, a closer inspection of the job descriptions suggests that practical competencies are weighted at least as heavily, if not more so, than degrees. Employers frequently require evidence of specific programming skills (e.g., Python, R, SQL), machine learning frameworks (e.g., TensorFlow, PyTorch), or cloud services (e.g., AWS, Azure). Moreover, phrases like "hands-on experience," "portfolio of past projects," and "ability to apply AI techniques in business contexts" appear repeatedly. This reflects a global shift toward skills-based hiring, where demonstrable evidence of applied capabilities is often valued over formal credentials (Dondi et al., 2021).

Certifications and Industry Credentials

Several job postings also highlight the relevance of industry-recognized certifications, such as cloud platform certificates (AWS Certified Machine Learning, Microsoft Azure AI Fundamentals), or general data science training programs (Google TensorFlow Developer Certificate, Coursera specializations). These certifications are often positioned as substitutes or complements to formal degrees, particularly in cases where employers aim to expand their talent pool beyond graduates of elite universities. This trend resonates with findings from the World Bank, which observed that digital labor markets in emerging economies are increasingly open to non-traditional pathways, including bootcamps and online learning platforms.

Practical Skills as Evidence of Competence

The dataset further indicates that practical project experience whether through prior employment, internships, or participation in competitions (e.g., Kaggle challenges) is frequently cited as desirable.

Employers often request concrete demonstrations of applied knowledge, such as links to GitHub repositories, published research papers, or descriptions of real-world AI implementations. This reinforces the idea that, in dynamic and applied fields like AI, portfolios and work samples provide more reliable signals of competence than transcripts alone (Deming & Noray, 2020).

Compared to global markets, Indonesian employers appear somewhat conservative in maintaining degree requirements as a baseline filter. In contrast, leading firms in the United States and Europe increasingly advertise AI roles without strict degree conditions, instead prioritizing skill assessments, hackathons, and project-based interviews (Linkedin, 2022). This difference may stem from cultural expectations regarding higher education in Indonesia, as well as the relative nascency of AI integration across local industries. Nevertheless, the rising visibility of certifications and project-based evaluation criteria in the dataset suggests that Indonesia is gradually moving toward more skills-focused hiring models.

4. CONCLUSION

This study examined the landscape of AI-related job postings in Indonesia to understand the interplay between workforce demand, technical competencies, and business-oriented skills. By analyzing a sample of 100 postings from JobStreet, the research highlights that the Indonesian AI labor market is characterized by both traditional educational requirements and an increasing emphasis on demonstrable, practical competencies. Employers seek candidates who can bridge theoretical foundations with applied expertise, demonstrating not only technical proficiency in areas such as machine learning, programming, and cloud computing, but also soft and business skills essential for organizational integration. This reflects a hybrid expectation in which academic degrees serve as a baseline, while portfolios, certifications, and evidence of project experience have become decisive factors in employability.

The findings have several implications for practitioners and policymakers. For employers, the growing reliance on skills-based evaluation provides opportunities to expand recruitment beyond graduates of top universities, thus enlarging the talent pool. For higher education institutions, the results underline the need to reform curricula to incorporate applied projects, interdisciplinary teamwork, and industry collaborations that produce graduates who are ready for immediate contribution in AI-driven roles. Meanwhile, for policymakers, the study suggests that workforce development initiatives should not only strengthen STEM education pipelines but also invest in flexible upskilling mechanisms, such as bootcamps, certification programs, and partnerships with global technology platforms. These approaches are crucial to ensure inclusivity and to equip the workforce with both technical and adaptive capabilities needed for the evolving AI economy.

However, this study has several limitations that should be acknowledged. First, the dataset is limited to 100 AI-related job postings collected exclusively from JobStreet Indonesia, which, although representative, may not fully capture the diversity of recruitment channels such as LinkedIn, Kalibrr, or company-specific portals. Second, the cross-sectional design reflects workforce demand only at a single point in time, thus not accounting for temporal fluctuations in job postings. Third, the reliance on text-based analysis may overlook implicit skill requirements that are not explicitly stated in job advertisements. These limitations suggest caution in generalizing the findings and highlight the need for future research to adopt longitudinal designs, expand data sources, and apply more advanced natural language processing techniques for deeper insights.

Finally, the research contributes to theoretical understanding by situating the Indonesian AI labor market within broader global debates on the future of work. It reinforces the argument that labor markets are shifting from credential-based hiring toward evidence-based skill evaluation, while still retaining cultural and institutional path dependencies. Future studies could expand the dataset to include longitudinal analyses, tracking how preferences evolve over time, or compare Indonesia with other ASEAN countries to explore regional patterns. Such directions would enrich scholarly discourse and provide actionable insights for workforce policy and strategic human resource planning in the age of AI.

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