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Training Needs Assessment and Employee Skills Acquisition: Systematic Review of Strategies, Outcomes, and Best Practices

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Abstract
The implications of Industry 4.0 for workforce reskilling in Sub-Saharan Africa underscore the urgent need for effective employee skills development. Training Needs Assessment (TNA) plays a critical role in aligning workforce competencies with evolving labour market demands and advancing Sustainable Development Goals related to quality education and decent work. This systematic review examined the relationship between TNA and employees' skills acquisition in Sub-Saharan Africa. Relevant studies were identified through PubMed, Scopus, African Journals Online (AJOL), Google Scholar, and the World Bank Open Knowledge Repository. Study identification, screening, and selection followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, resulting in 23 studies for analysis. Thematic synthesis, supported by a mixed-methods integration of qualitative and quantitative findings, was employed. Methodological quality was assessed using the CASP checklist and the Newcastle-Ottawa Scale. Findings indicate that effective TNA strategies emphasise systematic assessment, stakeholder collaboration, and alignment with labour market needs, resulting in improved performance and employability. However, challenges such as resource constraints and resistance to change persist. The review underscores the importance of context-specific TNA frameworks to strengthen workforce development in Sub-Saharan Africa.

Introduction
In the contemporary global economy, characterised by rapid technological advancements and shifting labour market demands, the development of a skilled workforce is a cornerstone of sustainable economic growth and social progress. The advent of Industry 4.0, marked by automation, artificial intelligence, and digitalisation, has necessitated a paradigm shift in workforce training (Țurcan & Pojar, 2024). Sub-Saharan Africa, with a population exceeding 1.2 billion and a youthful demographic of over 60% under 25 and projected to contribute half of global population growth by 2050 (United Nations, 2019), stands at a critical juncture. These technological shifts are reshaping workforce demands, requiring enhanced skills in digital literacy, critical thinking, and adaptability.

The United Nations' Sustainable Development Goals (SDGs), specifically Goal 4 (quality education) and Goal 8 (decent work and economic growth), highlight the need to align training with labour market demands (United Nations, 2015). Training Needs Assessment (TNA) is a pivotal tool in this context, systematically identifying skill gaps, designing targeted interventions, and aligning workforce capabilities with organisational and market needs (Markaki et al., 2021). Grounded in human capital theory, which posits that investments in training enhance productivity and economic

growth (Becker, 1964; Schultz, 1971), TNA is essential for workforce development. Contingency theory further emphasises the need for context-specific training strategies tailored to regional challenges (Fiedler, 1967; Tannenbaum & Schmidt, 2017).

Despite its importance, the implementation of TNA in Sub-Saharan Africa faces significant barriers. While countries like Germany achieve high skills acquisition through effective TNA (OECD, 2024), Sub-Saharan Africa struggles with inadequate infrastructure, limited access to technology, and misalignment between training programmes and local labour market needs (Samunderu, 2024; UNESCO, 2023). The digital divide, with only 36% internet penetration in the region compared to the global average of 66% (International Telecommunication Union, 2024), exacerbates these challenges. Moreover, the informal economy and youth unemployment necessitate innovative TNA approaches that address local realities (AfDB, 2023; Asongu & Odhiambo, 2019).

While there is a growing body of evidence on training and skills acquisition, significant research gaps persist, particularly in Sub-Saharan Africa, where systematic reviews are scarce. Many studies focus on sector-specific interventions, such as agriculture or health, without integrating findings across industries, resulting in a fragmented understanding of TNA's effectiveness (Asongu & Odhiambo, 2019; Mincer, 1989; Oluwatobi et al., 2020). While quantitative data demonstrate training's positive impact on productivity and employment (World Bank, 2023; Psacharopoulos & Patrinos, 2018), qualitative insights into contextual barriers—such as attitudes toward training, gender disparities, or access to digital tools remain underexplored (Bhorat et al., 2023; Oketch, 2022). For instance, studies often overlook that informal economies, which dominate employment in the region, require tailored TNA approaches that differ from formal-sector models (Adams et al., 2013). Additionally, there is a lack of research on the scalability of TNA interventions across diverse Sub-Saharan African contexts, with most studies focusing on single countries or sectors (Ujah-Ogbuagu, 2023; Adeleke and Adeleke, 2024).

This systematic review, therefore, synthesises 23 studies from 2014 to 2024 to evaluate TNA strategies, measurable outcomes and emerging trends in Sub-Saharan Africa. By integrating thematic analyses, the review aims to address these gaps and offer insights into optimising TNA for the region's unique challenges. The findings will contribute to the global discourse on workforce development in developing economies, informing evidence-based policies and practices aligned with international development goals. By leveraging human capital and contingency theories, this review critically assesses how TNA can be tailored to foster a skilled, inclusive, and competitive workforce that thrives in a globalised economy.

Methodology

This study employs a systematic review methodology to analyse Training Needs Assessment (TNA) and employee skills acquisition in Sub-Saharan Africa, focusing on TNA strategies, outcomes and emerging trends across diverse sectors. A systematic review ensures a comprehensive, transparent, and replicable process for identifying, selecting, and critically appraising relevant research, aligning with established standards (Shaheen et al., 2023). The review is structured to provide a thorough and unbiased assessment of the literature on TNA and skills acquisition in Sub-Saharan African contexts, examining the interplay among methodological approaches, outcomes, and contextual influences.

Search Strategy

A comprehensive search of publications was conducted across multiple databases, including PubMed, Scopus, African Journals Online (AJOL), Google Scholar, and the World Bank Open Knowledge Repository, to capture peer-reviewed articles and grey literature, including policy reports, technical reports, institutional working papers, and development reports published by reputable organisations

such as the World Bank, UNESCO, International Labour Organisation (ILO), African Development Bank (AfDB), and World Economic Forum (WEF) between 2014 and 2024. This timeframe was selected to align with contemporary workforce development challenges, capture significant advancements in TNA methodologies, and include foundational studies from the provided dataset. Keywords, synonyms, and related terms were combined using Boolean operators (AND, OR) to refine database queries. To enhance transparency and reproducibility, the complete search strings used across the selected databases are presented in Table 1.

Table 1: Full Search Strings Used Across Databases

Database	Full Search String
PubMed	("training needs assessment" OR "training needs analysis") AND ("skills acquisition" OR "employee skills" OR "workforce development") AND ("Sub-Saharan Africa" OR Tanzania OR Kenya OR Nigeria OR Ethiopia OR Ghana OR "South Africa")
Scopus	TITLE-ABS-KEY ("training needs assessment" OR "training needs analysis") AND TITLE-ABS-KEY ("employee skills acquisition" OR "workforce training" OR "capacity development") AND TITLE-ABS-KEY ("Sub-Saharan Africa" OR Tanzania OR Kenya OR Nigeria OR Ethiopia OR Ghana OR "South Africa")
African Journals Online (AJOL)	("training needs assessment" OR "training needs analysis") AND ("skills acquisition" OR "employee performance" OR "workforce development") AND Africa
Google Scholar	"training needs assessment" "employee skills acquisition" "Sub-Saharan Africa"
World Bank Open Knowledge Repository	("workforce training" OR "skills development") AND Africa

Searches were limited to English-language publications from 2014 to 2024. The searches were conducted between January and February 2026. Example search strings included: "training needs assessment AND Sub-Saharan Africa" and "skills acquisition". Inclusion criteria encompassed peer-reviewed articles and literature from credible organisations (e.g., World Bank), published in English, and conducted in Sub-Saharan African countries addressing TNA strategies, outcomes, or emerging trends. Exclusion criteria included non-peer-reviewed sources without reputable authority, studies outside Sub-Saharan Africa, and those not addressing TNA or skills acquisition.

Screening Process

In the first stage, titles and abstracts of the 566 unique records were screened against predefined inclusion and exclusion criteria. Inclusion criteria required that studies be conducted in Sub-Saharan African countries, be published in English between 2014 and 2024 (with additional studies to align with contemporary trends), focus on TNA or skills acquisition, and provide sufficient methodological detail for data extraction. Records automatically excluded through database filtering tools and keyword relevance screening (n = 42,036), including non-English publications, conference announcements, duplicate indexing records, and studies unrelated to training needs assessment or skills acquisition. Records removed for other reasons (n = 40,828), including inaccessible full texts, incomplete records, editorials, book reviews, commentaries, and publications outside the Sub-Saharan African context. The initial screening identified 153 records for full-text review. In the second stage, two reviewers independently assessed the full texts for eligibility, focusing on relevance to the themes: TNA strategies, outcomes and emerging trends. The process resulted in 23 studies: seventeen (17) from the DATA.docx document and six (6) additional studies, representing 35.19% of screened full

texts. Figure 1 illustrates the study selection process, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a robust overview of the TNA and skills acquisition literature in Sub-Saharan Africa.

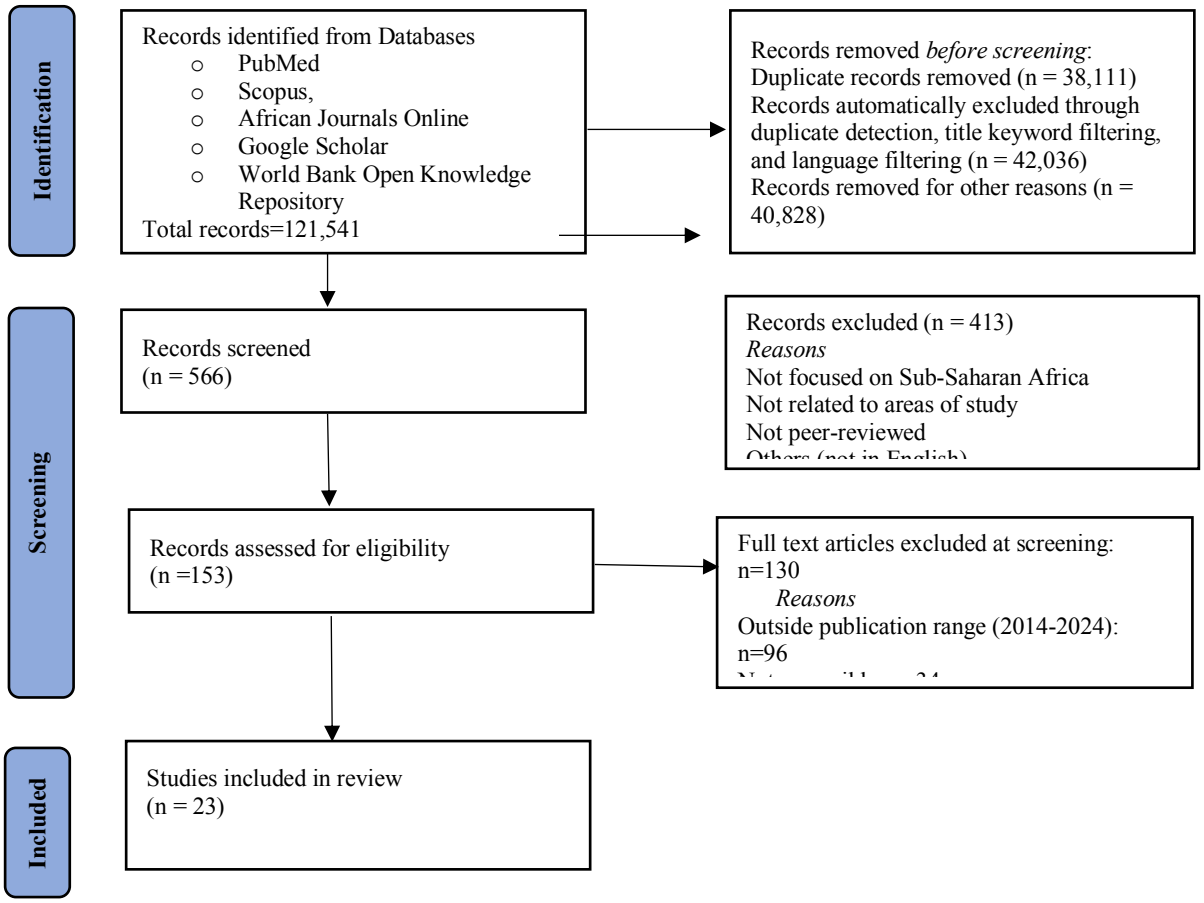

Figure 1: The Systematic Review Procedure, as Shown in the PRISMA Flow Diagram

Data Synthesis

The findings from the 23 selected studies were synthesised using a mixed-methods approach, focusing on the three major themes: TNA strategies, outcomes and emerging trends. Thematic analysis was employed to identify recurring patterns and categorise findings, including the prevalence of mixed-methods and demand-driven TNA. Data were extracted into a standardised template capturing: (1) study characteristics (author, year, country, sector); (2) TNA methodologies (e.g., mixed-methods, stakeholder collaboration); (3) findings (e.g., prevalence, outcomes like employee performance); and (4) challenges (e.g., resource constraints, data access). Quantitative data, such as prevalence percentages, were summarised descriptively. Qualitative data were synthesised narratively to highlight contextual shades. The synthesis integrated quantitative and qualitative evidence to provide a comprehensive understanding, with tables summarising prevalence, representative examples, key findings, and conflicting arguments for each theme.

Quality Assessment

To ensure the robustness and reliability of the review, a quality assessment was conducted for each of the 23 selected studies, evaluating methodological rigour and evidence strength. The Critical Appraisal Skills Programme (CASP) checklist was used to appraise qualitative studies, assessing the clarity of objectives, the appropriateness of the methodology, and the robustness of data collection. The Newcastle-Ottawa Scale (NOS) was applied to quantitative and mixed-methods studies to evaluate selection, comparability, and outcome measures. Studies with weaker designs, such as limited sample sizes or incomplete methodological reporting, were included for their contextual relevance but were noted to have reduced rigour. Quality scores informed the weighting of findings, with higher-quality studies given greater emphasis in the synthesis. The assessment process was transparent, with limitations like resource constraints affecting study rigour and small sample sizes acknowledged to ensure a balanced evaluation. The quality assessment mitigated potential biases, enhancing the reliability of the review's findings.

Ethical Considerations

Ethical considerations were integral to the review process, ensuring respect for the integrity of the included studies and their participants. All 23 studies were peer-reviewed or sourced from reputable grey literature, assumed to have undergone ethical review by their respective institutions. As no primary data collection involving human participants was conducted, direct ethical approval was not required. The review adhered to ethical principles by accurately representing study findings, avoiding selective reporting, and acknowledging limitations, including potential selection bias due to reliance on the provided DATA.docx dataset. Conflicts of interest were mitigated by using standardised inclusion criteria and quality assessment tools, ensuring impartiality. The inclusion of diverse Sub-Saharan African contexts (e.g., 10 countries) ensured equitable representation and addressed potential geographic or sectoral biases.

Methods for Extracting and Analysing Data

A structured data extraction process was implemented to systematically collect and organise relevant information from the 23 selected studies. A standardised extraction form was developed to ensure consistency and comparability, capturing: (1) study characteristics (author, year, country, sector); (2) TNA methodologies (e.g., mixed-methods, ICT integration, stakeholder partnerships); (3) findings (e.g., prevalence of trends; outcomes); and (4) challenges. Two reviewers independently extracted data, with cross-verification to ensure accuracy, resolving discrepancies through collaborative discussion to achieve consensus. For example, quantitative data were recorded, while qualitative data were documented narratively. Data analysis employed both qualitative and quantitative approaches. Qualitative synthesis identified recurring themes and insights into collaborative ecosystems. Quantitative analysis summarised prevalence data and statistical outcomes, providing a clear overview of trends and impacts. The integration of qualitative and quantitative methodologies offered a comprehensive understanding of TNA and skills acquisition, with rigorous cross-verification ensuring credibility and reliability.

Limitations

Several limitations may affect the robustness of this systematic review. First, reliance on English-language publications introduces potential language bias, as studies in local languages (e.g., Swahili, French, and Amharic) may have been excluded, potentially overlooking regionally specific insights, particularly in countries like Ethiopia. Second, publication bias may exist, as the review prioritised peer-reviewed journals and grey literature from accessible databases (e.g., PubMed, Scopus), potentially missing unpublished studies or those in less-indexed regional journals. Third, the heterogeneity of study designs ranging from qualitative case studies to quantitative surveys poses challenges in synthesising findings, as methodological differences (e.g., sample sizes from 50 to 500

participants) could affect comparability. Fourth, the 2014–2024 timeframe may exclude historical data critical to understanding long-term TNA trends. Finally, reliance on the provided DATA.docx dataset may introduce selection bias, as it pre-selected 17 studies. To address these limitations, future reviews could incorporate multilingual searches, include unpublished data through stakeholder consultations, and standardise methodological approaches to enhance synthesis accuracy.

Results

This section presents major findings revealed from 23 studies in sub-Saharan Africa focusing on Training Needs Assessment (TNA) strategies, outcomes and emerging trends.

Quality Assessment of Included Studies

Quality assessment using the CASP checklist and Newcastle-Ottawa Scale (NOS) indicated that most included studies demonstrated moderate to high methodological quality. Studies employing mixed-methods and quantitative designs generally scored higher due to clear objectives, appropriate sampling procedures, and robust data analysis techniques. However, several studies had limitations, including small sample sizes, inadequate reporting of data collection procedures, and limited discussion of bias and validity measures. Qualitative studies assessed using CASP generally demonstrated strong contextual relevance but varied in methodological transparency. Overall, higher-quality studies were given greater emphasis during thematic synthesis.

Training Needs Assessment Strategies

In this review study, four primary Training Needs Assessment (TNA) strategies were identified: stakeholder engagement, multi-level analysis, mixed-methods approaches, and labour market assessment. Table 2 presents their prevalence in the reviewed literature and their applications. Stakeholder engagement involves collaboration with employees, employers, community members, and industry partners to ensure TNA aligns with organisational and market needs. Multi-level analysis, often guided by frameworks like the McGehee and Thayer Model, integrates organisational, task, and individual assessments to ensure comprehensive TNA. Mixed-methods approaches combine quantitative (e.g., surveys) and qualitative (e.g., interviews, focus groups) data collection to provide a holistic understanding of training needs. Labour market assessment aligns TNA with external job market demands to ensure that employable skills are developed.

Table 2: TNA Strategies

TNA Strategy	Percentage of Studies	Representative Examples	Key Findings	Conflicting Arguments
Stakeholder Engagement	47%	South Africa vocational (Mayombe, 2021); Tanzania TPA (Bunduki & Rutenge, 2024); Nigeria immunisation (Arogundade et al., 2019); Senegal healthcare (Nagai et al., 2017)	Enhances training relevance through inclusive processes; improves alignment with market needs (Mayombe, 2021).	Low participation (20% at TPA) and employee resistance (36%) undermine effectiveness (Bunduki & Rutenge, 2024).
Multi-Level Analysis	41%	Kenya ICT SMEs (Nganu & Hannah, 2018); Tanzania TPA (Bunduki & Rutenge, 2024); Ethiopia public administration (Asfaw et al., 2015); Ethiopia university staff (Yimam, 2022)	Ensures comprehensive needs identification via organisational, task, and individual analyses (Nganu & Hannah, 2018).	Resource-intensive, limiting feasibility in low-resource settings like TPA (Bunduki & Rutenge, 2024).
Mixed-Methods Approaches	53%	South Africa vocational (Mayombe, 2021); Tanzania tourism (Anderson & Sanga, 2019); Nigeria immunisation (Arogundade et al., 2019); Botswana agriculture (Tehaesele et al., 2018)	Provides robust, triangulated data for holistic TNA; enhances validity (Mayombe, 2021).	Time and expertise demands limit feasibility in resource-constrained settings like Botswana (Tehaesele et al., 2018).
Labour Market Assessment	35%	South Africa vocational (Mayombe, 2021); Kenya LIS (Kavulya, 2007); Ghana entrepreneurial (Asamoah, 2014); Nigeria HIM (Adeleke et al., 2014)	Enhances employability by aligning TNA with job market demands; 91.6% confirm demand in LIS (Kavulya, 2007).	Internal organisational focus limits application, as in postal services (Ejakait, 2021).

Training Needs Assessment Outcome

Training needs outcomes aligned with labour market demands, identification of barriers and challenges, support for sustainable development goals, and implications for policy and practices. The results in Table 3 present findings from review studies across Sub-Saharan African contexts emphasises the critical role of Training Needs Assessment (TNA) in achieving positive workforce development outcomes, with enhanced employee performance (50%), improved organisational efficiency (45%), increased employability (35%), and improved employee engagement (30%) emerging as key indicators of success. These outcomes observed across diverse sectors, including public administration, healthcare, Small and Medium Enterprises (SMEs), tourism, and education, highlight the transformative potential of well-designed TNA in addressing skill deficiencies and aligning with organisational and market demands. However, the review also reveals significant challenges that limit the realisation of these outcomes, particularly in resource-constrained settings.

Table 3: Training Needs Assessment Outcomes

Outcome	Percentage of Studies	Representative Examples	Key Findings	Challenges
Enhanced Employee Performance	50%	Kenya ICT SMEs (Nganu & Hannah, 2018); Ethiopia university staff (Yimam, 2022); Ethiopia public administration (Asfaw et al., 2015); Nigeria HIM (Adeleke et al., 2014); South Africa SMEs (Wiid and Cant, 2024)	Systematic TNA improves skills and productivity; Kenya SMEs showed 0.497 unit performance increase per TNA unit (Nganu & Hannah, 2018); South Africa SMEs reported higher efficiency with structured TNA (Wiid and Cant, 2024).	Inconsistent TNA limits performance gains; Zambia nursing students reported inadequate skill acquisition (66.25%) due to poor TNA (Tambo et al., 2024).
Improved Organisational Efficiency	45%	Tanzania TPA (Bunduki & Rutenge, 2024); South Africa vocational (Mayombe, 2021); Ethiopia public administration (Asfaw et al., 2015); Kenya postal (Ejakait, 2021); Tanzania public sector (Mdegela, 2020)	Targeted training enhances service delivery; Ethiopia public administration showed 0.25 SD efficiency increase (Asfaw et al., 2015); South Africa vocational training improved operational outcomes (Mayombe, 2021).	Misaligned TNA reduces efficiency; Kenya postal services showed no significant improvement due to unsystematic TNA (Ejakait, 2021).
Increased Employability	35%	Kenya LIS (Kavulya, 2007); South Africa vocational (Mayombe, 2021); Ghana entrepreneurial (Asamoah, 2014); Nigeria HIM (Adeleke et al., 2014); South Africa SMEs (Wiid and Cant, 2024)	Market-aligned TNA boosts job prospects; 91.6% of LIS respondents confirmed job market demand (Kavulya, 2007); Sub-Saharan SMEs reported improved employability with TNA (Wiid and Cant, 2024).	Skills mismatches limit employability; West Africa nutrition training had low graduate output (517 vs. 2,028 recommended) (Sodjinou et al., 2014).
Improved Employee Engagement	30%	Kenya universities (Muma et al., 2014); Senegal healthcare (Nagai et al., 2017); Zambia nursing (Tambo et al., 2024); Tanzania tourism (Anderson & Sanga, 2019); Tanzania public sector (Mdegela, 2020)	Effective TNA increases motivation; Senegal healthcare workers reported higher motivation with training (Nagai et al., 2017); Tanzania public sector showed improved commitment (Mdegela, 2020).	Poor TNA and working conditions reduce engagement; Zambia nursing students had low motivation (51.25%) due to inadequate TNA (Tambo et al., 2024).

Emerging Trends in Training Needs Assessment

Emerging trends were considered important in this study because they reflect innovative methodologies, technologies and paradigms that enhance the identification of skills gaps and align workforce development with evolving market demands in Sub-Saharan Africa. This study synthesises findings from reviewed studies, identifying three key TNA-specific trends: integration of ICT and data analytics, demand-driven TNA, and collaborative ecosystems as presented in Table 4. These trends are evaluated for their prevalence and applications. Integration of ICT and data analytics in TNA leverages digital tools to enhance data collection and analysis, while demand-driven TNA aligns assessments with labour market and employer needs to enhance employability. Moreover, collaborative ecosystems foster stakeholder partnerships to enhance the relevance of TNA.

Table 4: Prevalence of Emerging Trends

Emerging Trend	Percentage of Studies	Representative Examples
Integration of ICT and Data Analytics	29%	Kenya LIS (Kavulya, 2007); Nigeria HIM (Adeleke et al., 2014); Kenya SMEs (Nganu & Hannah, 2018); West Africa nutrition (Sodjinou et al., 2014)
Demand-Driven TNA	35%	South Africa vocational (Mayombe, 2021); Tanzania TPA (Bunduki & Rutenge, 2024); Ghana entrepreneurial (Asamoah, 2014); Nigeria immunisation (Arogundade et al., 2019)
Collaborative Ecosystems	29%	Ghana entrepreneurial (Asamoah, 2014); Tanzania tourism (Anderson & Sanga, 2019); West Africa nutrition (Sodjinou et al., 2014); Ethiopia preceptors (Negesso et al., 2022)

Discussion

Interpretation of Training Needs Assessment Strategies

The findings of this review demonstrate that effective Training Needs Assessment (TNA) in Sub-Saharan Africa increasingly relies on context-sensitive, participatory approaches rather than conventional top-down training models. The prominence of stakeholder engagement, mixed-methods approaches, and labour market-oriented assessments suggests that organisations are gradually recognising the importance of aligning training interventions with both institutional objectives and broader socio-economic realities (Mayombe, 2021; Anderson & Sanga, 2019; Nganu & Hannah, 2018). This reflects the growing complexity of workforce development in developing economies, where skill demands are rapidly changing due to technological advancement, globalisation, and labour market transformation (Ţurcan & Pojar, 2024; OECD, 2024).

The widespread application of mixed-methods approaches indicates that workforce challenges in Sub-Saharan Africa cannot be adequately understood through quantitative indicators alone. The integration of surveys, interviews, focus group discussions, and document reviews enables organisations to capture both measurable skill gaps and contextual factors that influence employee performance and training effectiveness (Mayombe, 2021; Arogundade et al., 2019). This finding supports contingency theory, which argues that organisational strategies should be adapted to specific environmental and institutional conditions rather than relying on universal approaches (Fiedler, 1967; Tannenbaum & Schmidt, 2017). In resource-constrained settings, where workplace realities are shaped by institutional limitations, socio-cultural dynamics, and informal employment structures, flexible and context-driven TNA models become particularly important (Asongu & Odhiambo, 2019).

Similarly, stakeholder engagement emerged as a critical component of effective TNA because it enhances ownership, relevance, and alignment between training content and actual workplace needs (Asamoah, 2014; Nagai et al., 2017). The involvement of employees, employers, industry actors, and community stakeholders strengthens the legitimacy and applicability of training interventions. However, the review also suggests that stakeholder participation remains inconsistent across institutions. In several contexts, low employee involvement and resistance to organisational change reduced the effectiveness of TNA implementation (Bunduki & Rutenge, 2024). This indicates that TNA should not be viewed merely as a technical exercise, but rather as an institutional and organisational process that requires trust, communication, and managerial commitment.

The findings further reveal that labour market assessment remains insufficiently integrated into many TNA frameworks despite its importance for employability and workforce competitiveness. This reflects a persistent gap between training systems and labour market realities across many Sub-Saharan African countries. While some sectors have increasingly adopted market-responsive approaches, many institutions continue to prioritise internal organisational needs without adequately considering external employment dynamics (Ejakait, 2021). The limited availability of reliable labour market information systems, particularly in low-resource contexts, further constrains evidence-based workforce planning (Tehaesele et al., 2018). Consequently, training programmes often fail to respond effectively to emerging technological and economic demands, contributing to skills mismatches and unemployment (Muchira et al., 2023; UNESCO, 2023).

More broadly, the findings suggest that institutional capacity plays a decisive role in determining the success of TNA implementation. Organisations with stronger managerial systems, better funding, and clearer strategic planning frameworks were more likely to conduct systematic and effective assessments (Mdegela, 2020; Wiid & Cant, 2024). Conversely, institutions operating under financial and technological constraints frequently experienced fragmented and inconsistent TNA processes (Bunduki & Rutenge, 2024; Tehaesele et al., 2018). This demonstrates that the effectiveness of TNA is determined not solely by methodological design but also by the broader institutional environment in which training systems operate.

Interpretation of Training Needs Assessment Outcomes

The review findings indicate that systematic and well-structured TNA contributes significantly to employee performance, organisational efficiency, employability, and workforce engagement. These outcomes support Human Capital Theory, which argues that investment in employee competencies enhances productivity, innovation, and organisational performance (Becker, 1964; Schultz, 1971). Across the reviewed studies, organisations that implemented structured TNA frameworks were generally better able to identify relevant skill gaps and design targeted training interventions that improved workforce effectiveness (Nganu & Hannah, 2018; Asfaw et al., 2015).

The positive relationship between TNA and employee performance suggests that training is more effective when informed by actual organisational and individual competency needs. Rather than delivering generalised training programmes, systematic TNA enables institutions to prioritise strategic skills that directly influence job performance and service delivery (Goldstein & Ford, 2002). This finding is particularly important in the context of Sub-Saharan Africa, where many organisations face growing pressure to improve productivity and institutional competitiveness despite limited resources (World Bank, 2023).

At the organisational level, the findings imply that TNA functions not only as a human resource management tool but also as a mechanism for institutional strengthening. Effective training interventions improve operational efficiency, service quality, and organisational adaptability (Asfaw et al., 2015; Mayombe, 2021). This is especially important in sectors such as healthcare, education, and public administration, where workforce capacity directly affects social and developmental outcomes. However, the review also demonstrates that the benefits of TNA are not automatic. In several contexts, weak implementation processes, inadequate resource allocation, and poor alignment between training content and organisational objectives reduced the effectiveness of training interventions (Ejakait, 2021; Bunduki & Rutenge, 2024). These inconsistencies highlight the importance of institutional readiness and strategic coordination in achieving meaningful workforce development outcomes.

The findings regarding employability further suggest that TNA is increasingly becoming a critical instrument for addressing labour market transitions associated with digitalisation and Industry 4.0. Training programmes that integrate labour market demands and practical competencies appear better positioned to enhance employment opportunities and workforce adaptability (Kavulya, 2007; Asamoah, 2014). Nevertheless, the review reveals that many training systems in Sub-Saharan Africa continue to struggle with outdated curricula, inadequate practical exposure, and weak industry linkages (Anderson & Sanga, 2019; Sodjinou et al., 2014). As a result, graduates and employees often possess qualifications that do not adequately correspond with emerging labour market requirements (Muchira et al., 2023).

The findings also indicate that employee engagement and motivation improve when workers perceive training as relevant, fair, and responsive to their professional needs (Nagai et al., 2017; Mdegela, 2020). This suggests that TNA contributes not only to the development of technical competency but also to organisational commitment and morale. However, poor working conditions, limited participation in training decisions, and inconsistent assessment procedures can undermine employee confidence in organisational training systems (Tambo et al., 2024). Thus, the success of TNA depends partly on the extent to which employees perceive training processes as inclusive and beneficial to their career development.

Overall, the findings demonstrate that effective TNA can support broader development objectives by strengthening workforce capacity, improving institutional performance, and enhancing employability. However, the uneven outcomes observed across studies suggest that workforce development challenges in Sub-Saharan Africa are closely linked to structural issues, including limitations in institutional capacity, technological inequalities, and resource constraints (AfDB, 2023; UNESCO, 2023).

Emerging Trends and Future Directions in Training Needs Assessment

The review identifies a gradual transition toward more technology-driven, market-oriented, and collaborative approaches to TNA across Sub-Saharan Africa. The increasing integration of Information and Communication Technology (ICT) and data analytics into TNA processes reflects broader global shifts toward digital workforce development systems (Adeleke et al., 2014; Mdegela, 2020). Digital tools have the potential to improve the efficiency, speed, and accuracy of training assessments by facilitating large-scale data collection, analysis, and monitoring (Markaki et al., 2021). This transformation is particularly important in the context of Industry 4.0, where digital competencies and adaptive learning systems are becoming essential components of workforce competitiveness (Țurcan & Pojar, 2024).

However, the uneven adoption of ICT-based TNA systems across Sub-Saharan Africa highlights persistent digital inequalities. Many institutions continue to face infrastructural limitations, unreliable internet connectivity, inadequate technological expertise, and financial constraints that restrict the effective implementation of digital assessment systems (International Telecommunication Union, 2024; Adeleke et al., 2014). This suggests that technological innovation alone cannot solve workforce development challenges unless accompanied by broader investments in institutional and digital infrastructure (UNESCO, 2023).

The growing emphasis on demand-driven TNA further demonstrates increasing recognition that training systems must respond more directly to labour market realities. Traditional supply-driven training models are gradually being replaced by approaches that prioritise employer expectations, sectoral skill demands, and practical competencies (Mayombe, 2021; Asamoah, 2014). This shift reflects changing workforce dynamics associated with economic transformation, youth

unemployment, and technological change across the region (World Economic Forum, 2023). Nevertheless, the effectiveness of demand-driven TNA remains constrained by weak labour market information systems and limited coordination between educational institutions and industries (Tehaesele et al., 2018).

Another important trend emerging from the review is the growing importance of collaborative ecosystems in workforce development. Partnerships among governments, industries, academic institutions, and development organisations appear increasingly necessary to address complex training and employment challenges (Anderson & Sanga, 2019; Negesso et al., 2022). Collaborative approaches facilitate knowledge sharing, resource mobilisation, and alignment between training systems and economic priorities. In many Sub-Saharan African contexts, where institutional capacities remain limited, such partnerships may provide important opportunities to strengthen workforce development systems and enhance training relevance (Sodjinou et al., 2014).

The findings, therefore, suggest that the future of TNA in Sub-Saharan Africa will depend on institutions' ability to develop integrated, flexible, and context-responsive assessment systems. Policymakers and practitioners should prioritise investments in digital infrastructure, labour market intelligence systems, stakeholder engagement mechanisms, and institutional capacity development (AfDB, 2023; OECD, 2024). Future research should also move beyond short-term training outcomes and examine the long-term effects of TNA on organisational transformation, employability, and economic development. Additionally, more longitudinal and comparative studies are needed to understand how different institutional and socio-economic contexts influence the sustainability and effectiveness of TNA interventions across the region.

Conclusion

This systematic review highlights the critical importance of Training Needs Assessment (TNA) in enhancing employee skills acquisition and aligning workforce capabilities with market demands in Sub-Saharan Africa. The findings underscore the necessity for tailored TNA strategies that incorporate stakeholder engagement, mixed-methods approaches, and labour market assessments to effectively address the region's unique challenges. Despite the potential benefits of TNA, significant barriers such as resource constraints, low stakeholder participation, and inadequate access to labour market data persist, limiting the effectiveness of training initiatives. The review identifies key outcomes associated with effective TNA, including enhanced employee performance, improved organisational efficiency, increased employability, and greater employee engagement, while also acknowledging conflicting arguments highlighting the challenges of achieving these outcomes. To optimise TNA practices, it is essential for policymakers and practitioners to invest in robust frameworks, improve labour market data systems, and foster inclusive stakeholder engagement. Future research should focus on longitudinal studies to assess the long-term impacts of TNA and explore innovative, cost-effective models suitable for resource-constrained environments. By addressing these gaps and challenges, Sub-Saharan Africa can leverage its youthful demographic potential and drive sustainable economic growth through a skilled and adaptable workforce.

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