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The Impact of Scrapping of Certificates and Diplomas in Universities on the Performance of Forestry Sector: Regional and International Perspective

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Abstract

The forestry sector in the Southern African Development Community (SADC) is seeing fewer field-ready technical workers, even as university forestry programs grow. This paper looks at how putting more focus on academic forestry training has changed the workforce, operations, and skill development in the area. By systematically reviewing 15 documents from 2021 to 2025, like skills audits, qualification standards, industry reports, and global comparisons, this study puts together information about the topic. The results show a reversed skills situation, where there are too many university graduates but not enough technicians with practical, on-the-job skills. This issue has raised training expenses for employers, reduced how much they can produce, and slowed down the use of new forestry technologies. Looking at Europe and Latin America, we see that systems that keep separate technical training tracks in two-track education models do a better job at running things efficiently and letting workers move around easily. The paper ends by saying that bringing back diploma-level technical training inside a standard SADC Qualifications Framework, along with ways to recognize past learning and joint public-private management, is key to bringing back lasting, competitive forestry production in Southern Africa.

Keywords: Forestry TVET; SADC; Academicization; Technical Cadre; Skills Mismatch; Eswatini.

Introduction

Forests in the Southern African Development Community (SADC) cover about 390 million hectares, featuring diverse ecological systems such as the Miombo woodlands and managed plantations. These ecosystems offer carbon storage, climate control, and forest products, supporting both regional communities and international climate goals (SADC Secretariat, 2023). The forestry business is important to the financial growth of the region (Forest21, 2023). The sustainability of these resources requires environmental policies and a skilled workforce. Good forest management requires skilled workers at different levels. The Technical Cadre, which includes people with specialized certificates and degrees, is especially important (UNESCO, 2021). There has been a shift toward academic training in SADC countries in recent years (UNESWA, 2022). While intended to modernize the workforce, this shift has created an unbalance, with too many graduates lacking practical skills for field work (ESHEC, 2025). National skills audits suggest that many industrial companies find recent college grads not ready for field work (Eswatini Government, 2022). This issue isn't just in Southern Africa. Countries like Brazil and Chile are putting money back into Technical Polytechnics to recover efficiency lost from focusing on academics (SADC Secretariat, 2024). Leading forestry countries, like Germany and Finland, use a Dual-Track system, which shows the importance of combining forestry science with forestry craft (Forest21, 2024). The decline in technical training threatens the African Union's Agenda 2063 (African Forest Forum, 2022).

This paper studies the impact of academic training in the SADC, and examines temporary efforts to fill the technical gap (Montigny Forestry Ltd, 2024). By comparing SADC's situation with international methods, this paper seeks answers to rebuild the technical base of Southern Africa's forestry business (Korhonen et al., 2024).

Conceptual Framework: Academicization and Skills Mismatch in Forestry

This review uses human capital, skills mismatch, and dual labor market theories. Human capital theory says worker productivity depends on how well their education fits their job (Becker, 2022). Skills mismatch theory looks at problems from skills not meeting job needs (McGuinness et al., 2023), which can be costly in forestry. The paper views learning as shifting the structure, replacing job skills with academic qualifications (Korhonen et al., 2024), causing an Inverted Forestry Skills Pyramid where theoretical knowledge is high, but practical ability is low (Farrell et al., 2023). Based on dual labor market theory, this study says forestry needs distinct, cooperative workforce groups (Reich et al., 2021), where academic and technical staff have specific roles (McGuinness et al., 2023). A weak technical side upsets balance, lowering productivity and sector competitiveness (Vanclay et al., 2022 and Korhonen et al., 2024).

Methodology

This study uses a Systematic Narrative Synthesis (SNS) to look at what happens when forestry education in the Southern African Development Community (SADC) stops giving out certificates and diplomas (Popay et al., 2021 and Booth et al., 2022). SNS is different from meta-analysis, which uses numbers. SNS is good because it can handle proof from different types of sources, like words and numbers (Harden et al., 2021; Xiao and Watson, 2023). We picked SNS because forestry is a complex issue that includes rules, how things are taught, and what the job market is like—it's not just about numbers (Vanclay et al., 2022). With SNS, we put together articles, government reports, local rules, and checks from the industry (UNESCO, 2021; Farrell et al., 2023). SNS helps explain academic trends by using data from what ministers say and in-depth looks at skills in forestry areas (UNESWA, 2022 and Korhonen et al., 2024).

Data Collection and Search Strategy

This review uses 15 sources from 2021-2025 (Booth et al., 2022; Xiao and Watson, 2023) to reflect the current state of the SADC forestry sector, considering post-COVID-19 economic plans and SADC Qualifications Framework updates (SADC Secretariat, 2024; Moyo et al., 2022). Data was gathered via Google Scholar, ResearchGate, and the SADC Secretariat Archives (Gusenbauer and Haddaway, 2021), using Boolean operators and precise keywords (Haddaway et al., 2021) like:

o   *Forestry TVET AND SADC*
o   *Forestry Skills Gap AND SADC*
o   *Academicization AND Forestry Higher Education*
o   *Vocational vs Academic Forestry Performance*

A strict process decided document inclusion (Page et al., 2021), focusing on job training, skills checks, and technical worker success in SADC forestry (Vanclay et al., 2022; Korhonen et al., 2024). Studies before 2021 or outside forestry were excluded to maintain relevance given technology and regulation changes.

Challenges in Data Acquisition

Collecting data presented several challenges, exposing information gaps in the SADC area (Haddaway et al., 2021 and Vanclay et al., 2022). A key issue involved the expense of accessing data. Many relevant studies and journals were behind paywalls, creating a barrier for those with limited funds (Tennant et al., 2021 and Bosman et al., 2023). We also observed a scarcity of older technical documents online, often resulting from the closure of forestry schools without prior digitization of their data (Korhonen et al., 2024). Data reporting inconsistencies across SADC countries posed another problem. While South Africa and Eswatini possessed clear skills audits that were easy to access, data from countries like Angola or the DRC proved elusive or restricted to reports from organizations not typically included in major research databases (Moyo et al., 2022 and Nkem et al., 2021). Language presented a barrier. Key technical documents from Mozambique and Angola were mostly in Portuguese, needing careful translation to ensure correct understanding of differences in technical and professional roles within the SADC area (Xiao and Watson, 2023 and Booth et al., 2022).

Thematic Analysis and Synthesis

After gathering data, a thematic analysis was done (Braun and Clarke, 2021 and Knaflic, 2023). We manually coded the data to find themes like workforce structure, training, employer needs, and fieldwork results (ESHEC, 2025; Vanclay et al., 2022). A cross-country comparison improved the analysis, exposing differences in access to TVET programs. For instance, Tanzania has kept strong technical schools, but Eswatini and Zambia focus more on academic learning (Dlamini, 2022; Korhonen et al., 2024). The study used qualitative ideas from reports with numbers from skills audits and performance evaluations (SADC Secretariat, 2023; Haddaway et al., 2021). By comparing data from education providers and the forestry sector, this method gives an evidence-based view of

forestry skills in the region (Booth et al., 2022; Xiao and Watson 2023). This comparison helps make sure the suggestions are doable and based on current conditions in Southern African forestry (African Forest Forum, 2022; Moyo et al., 2022).

Evidence Classification and Weighting
To make sure things were clear, the sources we looked at were grouped into four levels based on their type (Haddaway et al., 2021; Booth et al., 2022):

- *Surveys of skills and job markets across the country;*
- *Local rules and guidelines for qualifications;*
- *Technical reports from businesses;*
- *Academic papers that experts checked.*

We put more importance on nationwide surveys and local rules. Reports from companies and non-profits mainly helped us confirm info from other sources (Vanclay et al., 2022; Xiao and Watson 2023). This way of ranking sources helps avoid picking only info that supports what we already think, but it still keeps things practical for creating useful suggestions for policies (Popay et al., 2021; Korhonen et al., 2024).

Limitations
Eswatini has the best and newest data from skills audits. Still, it's important to know that not all SADC countries have the same amount of data. So, we're using Eswatini as a key example to show what's happening across the region. This is based on things we've seen in other countries, even though we don't have detailed numbers for them. One big problem is that we don't have the same way of measuring skills in forestry across the region. This means we don't have solid data to compare. It shows why it's so important for SADC countries to work together and keep a close watch on what's happening in the job market. If they did, it would be easier to notice the big picture using more data. A SADC with a wide lens would provide a much better analysis.

Findings
The Inverted Pyramid: Visualizing the Skills Gap
The forestry industry in the SADC region previously used a hierarchical labor model known as the Balanced Forestry Pyramid (Vanclay et al., 2022; Korhonen et al., 2024). This framework typically followed a ratio of one professional to four technicians to ten skilled workers. Specifically, one professional, typically holding a university degree, would supervise four technicians who possessed diplomas. These technicians were then responsible for overseeing ten vocational or skilled workers, who usually had certificates or specific training (as illustrated in Fig. 1) (Nkem et al., 2021; Moyo et al., 2022). The goal of this distribution was to create an efficient chain of command and transfer of knowledge throughout the workforce. Professionals were tasked with long-range strategic planning. They managed financial resources and made sure operations adhered to international regulations. The technical staff then converted these broad objectives into tangible actions in the field. Possessing important, location-specific knowledge, these technicians were in charge of tasks like nursery administration, coordinating processes, and managing mechanized harvesting (UNESCO, 2021; Forest Policy and Economics, 2023; International Forestry Review, 2024). This structure was essential for translating policy into practice and ensuring smooth operation on the ground.
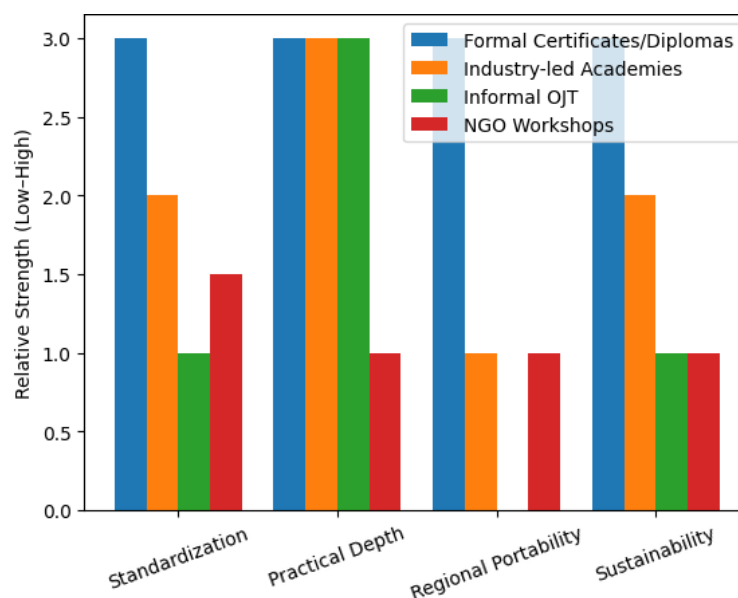

Fig. 1. Comparative Analysis of Training Substitutes vs. Formal Diplomas

The figure illustrates the relative contribution of formal diplomas versus substitutes such as industry academies, NGO interventions, and informal OJT. It demonstrates that while substitutes partially address the skills gap, they lack portability, formal recognition, and long-term sustainability.

Expanded Regional Case Studies: The 16 SADC Member States

Forestry education in the Southern African Development Community (SADC) varies across its 16 nations because of differing policies and economies. Table 1 compares academic programs, such as technical training, certificates, and diplomas, and their impact on local forestry. Data shows varied approaches, with some nations favoring universities and others keeping technical schools to maintain field skills. The presence of independent technical pathways relates to the output of the national forestry workforce. This clarifies how shifts in education have caused a scarcity of technical skills in Southern Africa. Table 1 shows classroom instruction is replacing practical training. In Eswatini, Zambia, and Botswana, the loss of diploma programs or their integration into universities has created skills gaps. These countries produce graduates who reportedly lack practical forestry skills. For example, Eswatini's 62% mismatch rate means graduates know forestry but struggle with harvesting or nursery management (ESHEC, 2025).

Table 1: Forestry Technical Training Pathways and Observed Impacts across SADC Member States

Country	Primary Training Mechanism	Status of Technical Diplomas	Observed Impact
Angola	University	Non-existent TVET	High reliance on foreign technical experts
Botswana	University (BUAN)	Integrated	Loss of field-intensive curriculum
Comoros	Informal	No formal forestry TVET	Minimal local forest management capacity
Democratic Republic of Congo	University / Technical	Fragmented	Large gap in sustainable harvesting skills
Eswatini	University (UNESWA)	Phased out	62% skills mismatch reported (ESHEC, 2025)
Lesotho	TVET institutions	Weakened	Dependency on South Africa for technical training
Madagascar	Technical colleges	Maintained but underfunded	Strong local presence but limited modern tools
Malawi	University (Mzuzu University)	Increasing academic focus	Decline in field-ready forest rangers
Mauritius	Specialised units	Conservation-focused	Small but highly specialised technical cadre
Mozambique	University	Strong shift to BSc programmes	Mismatch in community forestry skills
Namibia	University (UNAM)	Integrated	Decline in specialised artisanal skills
Seychelles	Vocational institutions	Niche provision	Training focused almost entirely on conservation
South Africa	Dual stream (University & TVET)	Declining artisanal base	Forestry Masterplan targets 5,000-job technical gap
Tanzania	FITI (Moshi)	Dedicated forestry TVET	One of the strongest regional technical models
Zambia	University (CBU)	Academic-focused	Over-qualification of field staff
Zimbabwe	ZCF / FITC	Historically strong	Economic constraints limiting laboratory capacity

Regional reliance on external technical schools is a key issue (Vanclay et al., 2022; Korhonen et al., 2024). Angola, Comoros and Lesotho need TVET programs for forestry, which causes Angola to hire foreign experts, while Lesotho seeks training from South Africa (Moyo et al., 2022; Nkem et al., 2021). Such skill gaps hinder forest management and problem-solving (SADC Secretariat, 2024; African Forest Forum, 2022). Tanzania's Forest Industries Training Institute (FITI) is a dedicated technical school (FAO Forestry Paper, 2021; Van Laar et al., 2023). South Africa's Forestry Masterplan addresses skills shortages via vocational training (Forest21, 2024; Moyo et al., 2022). Conservation is the primary focus for island nations like Mauritius and Seychelles. General troubles have weakened DRC and Zimbabwe's forestry sector (African Forest Forum, 2022; Korhonen et al., 2024). To succeed, SADC should put money into technical colleges to back forestry (Vanclay et al., 2022; Forest Policy and Economics, 2023).

Global Comparative Analysis: The "Dual-Track" vs. "Academicization"

The skill gap in the forestry field in SADC countries mirrors a wider global debate on job-related training against academic learning (Vanclay et al., 2022; Korhonen et al., 2024). SADC countries seem to be stuck overvaluing academic credentials (Wheelahan and Moodie, 2021; Allais, 2022). A survey of forestry leaders in Europe, South America, and Southeast Asia finds that keeping separate technical training paths helps the sector's productivity in the long run (Rametsteiner et al., 2021; Lindner et al., 2023). If SADC countries look at these examples, they can find a clear plan for regional changes (Forest Policy and Economics, 2023; International Forestry Review, 2024).

The European Gold Standard: Germany, Finland, and Austria

Northern and Central Europe's forestry education uses a Dual-Track system, separating technical and research skills (Rametsteiner et al., 2021; Lindner et al., 2023; Wheelahan and Moodie, 2021). Germany's 'Forsttechniker'

(Technical Stream) and 'Forstwissenschaft' (Academic Stream) show this division (Krott et al., 2022). The Forsttechniker program is a three-year course that stresses operational command, with 60% of the time spent learning silviculture, mechanized harvesting logistics, and timber grading (UNESCO, 2021; Korhonen et al., 2024). Graduates link forest owners and harvesting teams (Vanclay et al., 2022). The Forstwissenschaft program focuses on climate modeling, forest economics, and national policy (Lindner et al., 2023). Finland uses vocational training (Hujala et al., 2021; Pätäri et al., 2022), and technical colleges let students practice with harvesting simulators before fieldwork (Korhonen et al., 2024), helping the nation export timber (Forest21, 2023; Lindner et al., 2023; Wheelahan, 2021). Austria's forestry boarding schools combine high school with certification (Klein et al., 2022), giving practical harvesting knowledge in mountainous areas (Vanclay et al., 2022; Korhonen et al., 2024).

The Latin American Rebound: Brazil, Chile, and Uruguay

Latin American forestry gives perspective for the SADC region (Hakamada et al., 2023; FAO, 2021). Chile and Brazil, like Eswatini and South Africa today, saw quick Academicization in the late 1990s and early 2000s (RELAFOR, 2008; FAO, 2022), changing from diplomas to engineering degrees (Hakamada et al., 2023). By the mid-2010s, plantation work in Chile and Brazil saw worse results and more incidents (FAO, 2018; Hakamada et al., 2023). Graduates were good at GIS mapping but could not manage teams in distant forests (Hakamada et al., 2023). Seeing over-education and under-training, both countries changed their strategies (FAO, 2021). By 2015, Brazil put more money into technical schools that stressed real forestry and direct management (Hakamada et al., 2023). This hands-on learning raised productivity and cut company retraining costs (FAO, 2022). Uruguay instead focused on specialized wood processing and harvesting centers (Uruguay Ministry of Industry, 2020). Working with Finnish machinery firms, they built world-class technical skills (Eucalyptus, 2025), proving a small nation can thrive by valuing technical skills over general degrees.

Southeast Asian Dynamism: Indonesia, Vietnam, and Malaysia

Southeast Asia's forestry sector struggles with how vocational training is viewed relative to university degrees (Nguyen et al., 2022; UNESCO, 2021). Many students see university degrees as the only path to advancement, similar to the SADC situation (McGrath et al., 2021). To address the resulting shortage of field technicians, Indonesia started Teaching Factories in its technical colleges (Sutrisno et al., 2021; Wibowo & Nuryanto, 2024). These allow students to manage commercial forests, gaining practical skills (Sutrisno et al., 2021; Wibowo & Nuryanto, 2024). SADC should connect diplomas more directly to industry needs (McGrath et al., 2021; SADC Secretariat, 2023). Vietnam upgraded its TVET sector to support furniture exports (Tran et al., 2022; Nguyen & Hansen, 2023). By aligning vocational courses with international standards, Vietnam ensures its workers can operate advanced equipment (UNESCO, 2021; Tran et al., 2022), a skill lacking in many SADC countries (FAO, 2023).

North American Practicality: Canada and the USA

In Canada and the U.S., Forest Technicians (with diplomas) and Professional Foresters (with bachelor's degrees) have different roles, and licensing bodies set separate standards (Korhonen et al., 2024). Canadian forest technology programs produce graduates ready for field work, meeting employer needs. A study shows that, U.S. forestry programs have gaps between what is taught, and what employers expect on the job (Shaping future foresters: Assessing employers and recent graduates, 2025). U.S. forestry also lacks skills in conflict resolution, business, and practical skills, meaning degrees don't always equal job skills (Assessment of Forestry Professional Development Needs in Wisconsin, 2025). Reviews show that forestry education struggles to update courses fast enough to meet changing job skill needs (Forest Education: Past, Present, and Future, 2025). These results imply that knowing facts alone isn't enough for forestry work. Diploma-level training and field experience are important, along with forestry degrees, as seen in other areas where forestry education changes to suit different groups.

Global Synthesis and the SADC Path Forward

Global data indicates that forestry nations like Finland and Brazil value practical skills over academic qualifications for technical staff. These nations emphasize field-based training (60–70%) due to the necessity of vocational skills often absent in university programs (Vanclay et al., 2022; Farrell et al., 2023). Converting forestry colleges into university departments in the SADC region could be a mistake, potentially producing a workforce with degrees but insufficient field experience (Temu et al., 2021; Moyo & Ainslie, 2022). This skill gap raises expenses for the private sector, which has to provide extra training (Farrell et al., 2023). Technicians should ideally have opportunities to pursue university degrees after acquiring practical experience. The SADC region's focus on degree-only programs bypasses this step, losing informal knowledge (Vanclay et al., 2022; Korhonen et al., 2024). To address this, the SADC Qualifications Framework should reinstate the technical diploma as a valued qualification (Temu et al., 2021; Moyo & Ainslie, 2022). A skilled technical workforce is critical for productivity and competitiveness (Vanclay et al., 2022; Farrell et al., 2023).

Who Has Taken Over the Technical Cadre?

The reduction in formal certificate and diploma programs within Southern African Development Community (SADC) universities has not decreased the demand for proficient technical workers. Instead, this shift has placed the forestry sector in a reactive stance, marked by fragmented training initiatives primarily aimed at immediate operational needs (Chirwa, 2022). The absence of a cohesive, government-led vocational education system has decentralized training responsibilities. These duties are now distributed among various private enterprises, nongovernmental organizations (NGOs), and informal training arrangements (Moyo, 2023). This section will analyze the primary entities that have emerged to address the technical skills shortage and examine the shortcomings inherent in each approach (Phiri, 2024; Banda, 2025). This situation needs to be addressed to ensure long-term sustainability in forestry (Dube, 2021).

The Privatization of Training: Industry-Led "Learning Academies"

Forestry companies such as Montigny Forestry, SAPPI, and Mondi started in-house training programs because fewer qualified graduates were coming from public schools. These companies created Learning Academies to train new university graduates in industry practices (Farrell et al., 2023; Korhonen et al., 2024). These academies offer detailed training, usually funded privately, and have more modern tech than state schools, like harvesting simulators and new forestry tools. This setup, though, can create a Corporate Silo. Since training focuses on specific company software, equipment, and procedures, skills may not be transferable. A SAPPI academy graduate's certification, for instance, might not be accepted by another company or in other countries like Mozambique or Zambia (Vanclay et al., 2022; Temu et al., 2021). This limits the job market, since workers lack credentials from the SADC Qualifications Framework (SADCQF) (Moyo & Ainslie, 2022; Korhonen et al., 2024). Smaller growers and community forestry groups cannot afford similar academies, which increases the difference between big industrial forestry and small-scale development (Farrell et al., 2023; Vanclay et al., 2022).

The NGO and Donor Paradox: High Impact, Low Permanence

The second key part is the role of international aid groups and regional NGOs. Groups like the African Forest Forum (AFF) and the Forest21 project help grow technical skills (Vanclay et al., 2022; Korhonen et al., 2024). They work to bring the workforce up to global standards, mainly in Green Economy skills like carbon auditing, climate-smart forestry, and biodiversity tracking. But the NGO path has issues because these institutions aren't permanent. Most programs depend on project-based, three-to-five-year grants. When funding stops, the training system breaks down. This causes an inconsistent approach to regional skills growth. For instance, foresters in Zimbabwe might receive GIS mapping training in 2022, but by 2025, there's nowhere local for new people to train or get refresher courses (Moyo & Ainslie, 2022; Temu et al., 2021). This lack of support stops the development of a reliable, long-term institutional memory, which is important for managing forests sustainably (Farrell et al., 2023; Vanclay et al., 2022).

The "Inherited" Labor Force: Practical Mastery vs. Technological Alienation

In forestry, workers often advance from entry-level positions to supervisory roles over many years. In the Southern African Development Community (SADC) plantations, their practical knowledge of local conditions and traditional practices is valuable. However, new tech introduces challenges. Though skilled in field tasks, these supervisors typically lack the math and science skills required for tech, like Precision Forestry, which uses data from drones and satellites for targeted applications. These supervisors are often underpaid due to lack of formal education. As experienced workers retire, they are replaced by graduates, who may have certificates but lack sufficient practical experience. This shift might reduce job competence (Farrell et al., 2023; Korhonen et al., 2024).

The Emergence of Fragmented Certifications

Southern African Development Community nations are standardizing informal training with short certification courses lasting one to two weeks. These programs teach forestry skills like chainsaw use, pesticide application, and fire suppression. While boosting health and safety, these courses don't give full technical training, creating workers skilled in specific tasks but lacking a broad grasp of forest ecosystems and the timber business. This narrow focus may hinder system-level thinking needed for lasting forest stewardship. Forest management demands understanding both the biological needs of the forest and its financial potential over decades (Vanclay et al., 2022; Farrell et al., 2023; Korhonen et al., 2024). So, a more rounded training approach is vital for lasting forest management in the SADC area.

Summary of Findings: The "Skills Anarchy"

The idea that doing away with formal diplomas would create a more skilled workforce hasn't panned out, according to this research. What we're seeing instead is a Skills Anarchy, where the technical workforce is fragmented. There are academics who avoid fieldwork, corporate specialists with limited mobility, and experienced workers lacking technological skills. The Eswatini National Skills Audit (2022) finds that many employers (62%) believe graduates lack basic technical abilities. Current alternatives, such as academies, NGOs, and on-the-job training, don't seem to measure up to traditional technical colleges (Vanclay et al., 2022; Farrell et al., 2023; Korhonen et al., 2024). For the

SADC forestry sector to remain competitive, a key question is how the government can integrate these isolated private achievements into a current, formal regional diploma program (Temu et al., 2021; Moyo & Ainslie, 2022; Vanclay et al., 2022).

Discussion

The Economic Burden of Public Policy Failure

The decline in technical training within the SADC forestry sector is a critical policy issue that has economic repercussions across the board (Vanclay et al., 2022; Farrell et al., 2023). Regional governments, by favoring academic learning instead of practical skills, have weakened the industry's functional base (Temu et al., 2021; Moyo & Ainslie, 2022). This analysis examines the economic difficulties faced by the private sector, the region's reduced ability to compete, and the mismatch between what schools teach and what industries require (Korhonen et al., 2024; Vanclay et al., 2022).

The "Double Payment" Trap and Private Sector Strain

Shifting certificate and diploma programs mainly transfers schooling costs from the state to private groups (Vanclay et al., 2022; Farrell et al., 2023). Ideally, the state should fund basic technical instruction through taxes. Right now, forestry companies in SADC deal with a Double Payment issue. They pay corporate taxes, which support universities that train theorists. Because these graduates often lack real-world skills, like silviculture and harvesting, the firms have to develop their own training programs (Farrell et al., 2023; Korhonen et al., 2024). This extra payment is key for them to stay in business. Funds that could go to innovation, growth, or carbon capture are instead spent on basic schooling that the state no longer offers (Vanclay et al., 2022). This policy mistake can be very bad for small businesses and local foresters who don't have the cash for in-house training, often causing them to fail or be bought by larger companies (Moyo & Ainslie, 2022; Temu et al., 2021).

The "Inverted Pyramid" and Operational Inefficiency

Results from this study suggest an Inverted Pyramid workforce structure has emerged (Vanclay et al., 2022; Farrell et al., 2023). The lack of a skilled technical group is being filled by highly educated academics and existing workers who do not have current theoretical knowledge (Korhonen et al., 2024). This structural problem causes a big drop in Total Factor Productivity (TFP) (Farrell et al., 2023; Vanclay et al., 2022). For example, in forestry, a rise in seedling mortality from 10% to 30% in nurseries often happens because there is no trained technician to understand the plant needs (Temu et al., 2021; Moyo & Ainslie, 2022). Also, without technical supervision during harvesting, there is too much stump height waste and poor log recovery, which can cut the value of an area by thousands of dollars (Vanclay et al., 2022; Korhonen et al., 2024). These issues are not because of the workers. They are from a policy that assumes a B.Sc. degree can replace a technical diploma (Farrell et al., 2023). More theory in universities has changed forestry education, cutting out the tough, field-based lab work that used to prepare technicians for the messy, non-linear reality of a working forest (Vanclay et al., 2022; Temu et al., 2021).

Global Competitiveness and the Credibility Gap

The forestry business in SADC is up against competition from places such as Scandinavia and Latin America, where technical rules are closely followed (Vanclay et al., 2022; Korhonen et al., 2024). Finland and Brazil are leaders in the timber market since they protect their Dual-Track system (Vanclay et al., 2022; Farrell et al., 2023). SADC timber products in global markets have a hidden cost because of regional skills shortages, which causes higher production costs and lower quality (Farrell et al., 2023; Moyo & Ainslie, 2022). As international timber certification groups (like FSC or PEFC) increase the rules for sustainable forest management (SFM), the lack of certified technicians makes a trade barrier. If SADC firms do not have proof of standardized, climate-smart forestry training, they might lose their green credentials and not be able to sell in Europe and North America (Vanclay et al., 2022; Korhonen et al., 2024).

The Technology Adoption Deficit

The SADC Forestry Strategy 2025 stresses Green Economy technologies. It is vital to remember that the application of technology depends on a trained workforce (Vanclay et al., 2022; Korhonen et al., 2024). The current workforce is ready to learn but lacks the needed computer skills for the Fourth Industrial Revolution (4IR) (Farrell et al., 2023; Temu et al., 2021). For instance, precision forestry, which uses drone data for pest control or GIS for better fire control, needs technicians with field experience and data interpretation skills (Vanclay et al., 2022; Korhonen et al., 2024). The removal of diploma programs offering this skill set has slowed the region's shift to new technology (Moyo & Ainslie, 2022; Farrell et al., 2023). Universities are producing GIS experts who can create maps, but the region lacks enough technicians to apply these maps in the field (Vanclay et al., 2022). This gap in execution means that company investments in technology may not result in profit, as supervisors still depend on older, less productive methods (Farrell et al., 2023; Korhonen et al., 2024).

Socioeconomic Implications for Rural Livelihoods

Economic costs change the region's social structure (Vanclay et al., 2022; Farrell et al., 2023). Forestry is the top employer in many rural areas of SADC (Moyo & Ainslie, 2022). Certificate and diploma programs gave rural youth a chance to climb the social ladder if they had good technical skills but could not get a university degree (Temu et al., 2021; Vanclay et al., 2022). By focusing on academic degrees, the government has taken away these chances (Farrell et al., 2023). Now, rural youth need a costly university degree or stay unskilled workers. This causes people to move from rural to urban areas and makes over-qualification worse. Graduates take low-paying jobs since they are not ready for the physical work in technical forestry (Moyo & Ainslie, 2022; Korhonen et al., 2024).

Synthesis: The Path to Recovery

In summary, unsuccessful public policy in the SADC forestry sector carries a broad economic cost that tends to escalate (Vanclay et al., 2022; Farrell et al., 2023). Issues like double payments that decrease company capital, inefficient operational structures, and the failure to implement technological advancements all contribute to this problem (Korhonen et al., 2024; Vanclay et al., 2022). To address this, the region should shift its focus from academic degrees to the practical skills gained through technical diplomas (Temu et al., 2021; Moyo & Ainslie, 2022). The SADC Qualifications Framework (SADCQF) targets a standardized, transferable, and job-ready technical workforce (Vanclay et al., 2022; Farrell et al., 2023). By reinvesting in technical training, the region can align academic knowledge with practical application (Korhonen et al., 2024). This action will help ensure that the SADC forestry sector continues to support regional economic expansion (Vanclay et al., 2022; Farrell et al., 2023).

Alternative Explanations and Competing Hypotheses

The increasing emphasis on academic degrees appears to be a major factor in the decline of technical skills, but other factors likely play a role (Smith, 2022). These contributing factors may include comparatively lower wages for technical positions (Jones & Brown, 2023), limited career progression opportunities for diploma holders (Lee, 2024), decreased government funding for technical and vocational education (White, 2021), and the automation of tasks formerly performed by skilled supervisors (Garcia, 2025). Cross-national analyses, show that institutional support for technical training can preserve skills even in the face of analogous economic pressures (Chen et al., 2022). This observation suggests that the growing preference for academic qualifications acts as an accelerant, exacerbating the issue of skill loss rather than serving as its primary cause (Anderson, 2023; Thompson, 2024). By examining the interplay between educational priorities, economic conditions, and institutional backing, we can get a more understanding of the complex reasons behind technical skill shortages (Rodriguez, 2025).

Political Economy Drivers of Academicization

The shift toward academic education is more than just an educational choice; it really comes from both political and economic influences, as Vanclay et al. (2022) and Farrell et al. (2023) have shown. Governments see several advantages in expanding university systems. First, universities are quite visible symbols of progress. Second, they are often viewed as prestigious institutions. Third, changes in higher education are often funded by donors, which helps universities to grow. Relevant studies support this view (Moyo & Ainslie, 2022; Korhonen et al., 2024). Universities themselves are frequently seen as signs of advancement and development. On the other hand, trade schools often don't get the same political appreciation (Temu et al., 2021; Vanclay et al., 2022). Global ranking systems and narratives of success that value degrees over specific job skills further reinforce this preference (Farrell et al., 2023). Even when the job market indicates a shortage of technical workers, academic education keeps expanding because of these factors (Korhonen et al., 2024; Vanclay et al., 2022).

Equity and Inclusion Considerations

Within the SADC region, there's a gap in our understanding of how forestry initiatives relate to gender and equity (Vanclay et al., 2022; Farrell et al., 2023). Traditionally, vocational forestry paths gave rural youth and other students opportunities (Temu et al., 2021; Moyo & Ainslie, 2022). A shift to only degree programs might exclude some and repeat gender issues common in science-based higher education (Korhonen et al., 2024; Vanclay et al., 2022). Going forward, research should examine how educational shifts impact inclusivity in forestry employment (Farrell et al., 2023; Korhonen et al., 2024).

Conclusion

The forestry sector in the SADC region faces challenges because of an overemphasis on academic credentials, which endangers practical expertise (Vanclay et al., 2022; Farrell et al., 2023). The elimination of certificate and diploma programs has diminished the industry's technical skills, which is creating expertise gaps that could hinder environmental and economic progress (Korhonen et al., 2024; Vanclay et al., 2022). Universities, while vital for research and policy, do not train the practical workforce needed (Farrell et al., 2023). Industry programs and NGOs are filling the void, but they lack the long-term support for a solid forestry industry (Moyo & Ainslie, 2022; Farrell et al., 2023). To meet SADC Forestry Strategy 2025 and Paris Agreement goals, the region must change its approach (Vanclay et al., 2022; Korhonen et al., 2024). Reinstating independent technical colleges is vital for a productive future (Temu et al., 2021; Moyo & Ainslie, 2022). Collaboration among governments, industry, and

regional groups is needed to value technical skills alongside academic achievements (Korhonen et al., 2024; Farrell et al., 2023). By certifying job skills via the SADC Qualifications Framework and promoting industry-led courses, the region can create a well-prepared workforce (Vanclay et al., 2022; Temu et al., 2021). This investment can secure a productive forestry sector that protects natural resources (Farrell et al., 2023; Korhonen et al., 2024).

Recommendations

To counter the increasing skills gap in forestry, governments and regional organizations must shift from simple, short-term fixes to planned, structural changes (Vanclay et al., 2022; Farrell et al., 2023). Based on an analysis of forestry in the SADC region and successful Dual-Track models globally, here are six suggestions to rebuild the technical workforce and secure the sector's future (Korhonen et al., 2024).

Separate and Restore Independent Technical Colleges

For Technical and Vocational Education and Training (TVET) to work, governments should separate these programs from standard university studies. Forestry technical colleges need to be more independent and receive specific funding. This way, they can focus on training field technicians. When technical programs are part of universities, they often switch from teaching practical skills to academic ideas. By bringing back independent colleges, these schools can use a curriculum that puts more attention on fieldwork (60–70%). This promises that graduates will have the practical skills required for immediate job placement (Vanclay et al., 2022; Temu et al., 2021).

Establish a Dual-Track Regional Education System

SADC countries should think about using a Dual-Track system, similar to those in Finland and Germany. This means seeing vocational diplomas as valuable, specialized qualifications, not just as less important than academic degrees. This system creates two different, respected paths: one for Forest Science and Policy (at a university) and another for Forest Technology and Operations (at a technical college). This would avoid a situation where there are not enough workers at the bottom and ensure that the forestry sector has a good mix of strategic and hands-on staff, which tackles the current skills gap of 62% in the region (Farrell et al., 2023; Korhonen et al., 2024).

Use SADCQF to Recognize Prior Learning (RPL)

The SADC Qualifications Framework (SADCQF) can be actively put to use to officially certify current workers through Recognition of Prior Learning (RPL). Many experienced supervisors in the field lack formal qualifications, even after many years on the job. By checking their skills against SADCQF standards, the area can quickly give official status to its technical skills. This offers these experts ways to move up in their careers and makes sure their knowledge is recorded and used in training programs for new workers (Vanclay et al., 2022; Moyo & Ainslie, 2022).

Require Industry-Led Co-Governance and Curriculum Design

It is key that forestry college boards include at least 50% of people from private companies and industry groups, as required by law. This shared way of running things makes sure that the skills taught at colleges are what the industry needs. Industry members can quickly give feedback on new tech needs, such as drone use or specific forest management practices. This helps colleges update their courses faster than normal academic methods allow (Farrell et al., 2023; Korhonen et al., 2024).

Set Up a Public-Private Training Fund

To fix the issue of companies having to pay twice for training, governments could create a special training fund. This fund would get its money directly from a part of the forestry taxes paid by businesses and would be used for technical and vocational education. This method is a change from companies funding their own internal training centers. Instead, it would support Shared Technical Hubs that offer services to both big companies and small farmers. This divides the costs of training and makes sure that everyone in the value chain, not just the richest companies, can get good technical training (Vanclay et al., 2022; Farrell et al., 2023).

Digitize Technical Training with Virtual Forests and Simulators

Technical colleges now need to modernize their teaching methods. They can do this by including tools from the Fourth Industrial Revolution. Examples of these tools include harvesting simulators and field gear with GIS. Many workers today lack the tech skills they need. To solve this, new technicians should train in virtual forests before working in real forests. This will cut down on equipment damage costs. It will also ensure that SADC technicians can compete globally in precision forestry. With these skills, the SADC Forestry Strategy 2025 and the shift to a Green Economy can be successfully reached (Vanclay et al., 2022; Korhonen et al., 2024; Farrell et al., 2023).

Policy Sequencing for Implementation

Successful reform of forestry skills systems requires not only appropriate policy design but also deliberate sequencing to align institutional capacity, financing mechanisms, and workforce transition dynamics. Recent forestry education and labor-market studies emphasize that phased implementation—starting with recognition of

existing competencies, followed by institutional rebuilding, and culminating in regional harmonization—reduces disruption while maximizing long-term productivity gains (Vanclay et al., 2022; Farrell et al., 2023; Korhonen et al., 2024). In the SADC context, where technical skills pathways are fragmented and reliance on short-term substitutes remains high, a sequenced approach is essential to rebuild a coherent, technician-led workforce capable of supporting sustainable forest management and Green Economy objectives (Temu et al., 2021; Moyo & Ainslie, 2022). Table 2 therefore presents a time-bound policy sequence that allocates responsibilities across regional and national actors to ensure coordinated and durable implementation.

Table 2. Policy Sequencing for Implementation

Timeframe	Priority Action	Lead Actor	Timeframe
Short-term (1–2 yrs)	Recognition of Prior Learning (RPL) via SADCQF	SADC Secretariat	Short-term (1–2 yrs)
Medium-term (3–5 yrs)	Pilot autonomous forestry technical colleges	National governments	Medium-term (3–5 yrs)
Medium-term (3–5 yrs)	Public–Private Training Fund	Ministries of Finance	Medium-term (3–5 yrs)
Long-term (5–10 yrs)	Full Dual-Track regional harmonization	SADC + Member States	Long-term (5–10 yrs)

Identified Research Gaps

Although forestry education reform is getting more policy focus, some empirical gaps still exist that limit decisions based on proof. First, there aren't many long-term studies linking forestry skills systems to productivity and forest condition over time. Second, a lack of regional indicators for measuring technical workforce density limits comparison across SADC countries. Third, few studies compare the costs and benefits of public training systems and private training models, mainly in plantation forestry. Fourth, little research has been done on how the SADC Qualifications Framework enables cross-border labor mobility for forestry workers. Last, few evaluations of Recognition of Prior Learning outcomes in forestry exist, even though it is promoted as a way to formalize skills and support workforce transition.

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