Legal Analysis of Gender Disparities in Engineering: Perspectives from Engineering Law and Reform Pathways

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.908000241

Received: 15 August 2025; Accepted: 21 August 2025; Published: 05 September 2025

ABSTRACT

Gender inequality in the engineering profession remains pervasive, with Nigeria exemplifying entrenched disparities despite global and domestic equality frameworks. Women account for less than 12 per cent of registered engineers in Nigeria, reflecting a significant underrepresentation that persists notwithstanding constitutional guarantees, statutory prohibitions on discrimination, and ratified international instruments such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). This paper interrogates the persistence of inequality through feminist legal theory and intersectional analysis, situating engineering law at the intersection of gender justice and environmental governance. It combines doctrinal analysis with empirical material, including case studies, policy reviews, and interviews, to reveal the misalignment between formal norms and substantive outcomes. Findings demonstrate that weak enforcement, regulatory inertia, and cultural norms perpetuate occupational segregation, while professional licensing frameworks operate in gender-neutral but exclusionary ways. Comparative insights from South Africa, Norway, and Canada demonstrate that robust enforcement of equality norms, quota systems, and gender-responsive regulatory measures can redress systemic exclusion. The paper proposes a multi-level reform strategy encompassing legislative reform, stronger oversight, institutional capacity-building, and integration of gender equity into environmental and engineering regulation. By linking Nigeria's environmental jurisprudence with engineering governance, this study advances both scholarly discourse and practical frameworks for dismantling structural barriers and promoting inclusive development.

Keywords: Gender Disparities, Engineering Law, Equality in Engineering, STEM Gender Gap, and Professional Regulation

INTRODUCTION

Engineering has long been regarded as a discipline emblematic of technological progress and economic development. Yet it is also one of the most gender-imbalanced professions worldwide. Nigeria reflects this global trend with acute severity: women constitute only a fraction of the engineering workforce, facing structural, institutional, and cultural barriers that inhibit entry, retention, and advancement.[1] The Nigerian Society of Engineers (NSE) reports that as of 2021, women comprised fewer than 4,500 of its over 40,000 registered members.[2] Despite Nigeria's constitutional guarantees and ratification of international equality instruments, women remain starkly underrepresented in engineering, exposing the gap between formal commitments and lived realities. This paper situates the issue within the nexus of law, regulation, and environmental governance, highlighting engineering's central role in infrastructure, environmental protection, and extractive regulation. Exclusion here undermines both gender justice and sustainable development. The study's novelty lies in combining feminist legal theory, particularly intersectionality, with analysis of Nigeria's compliance with CEDAW, ILO Conventions, and the SDGs, alongside empirical evidence showing how weak enforcement, regulatory inertia, and cultural practices perpetuate systemic inequality.

[1] UNESCO, Cracking the Code: Girls' and Women's Education in Science, Technology, Engineering and Mathematics (STEM) (2017) 34

[2] Nigerian Society of Engineers (NSE), Membership Statistics Report (Abuja, 2021)

Comparative insights enrich this inquiry. South Africa's Employment Equity Act has fostered measurable, if uneven, progress in gender representation in engineering.[3] Norway's quota system for corporate boards illustrates the efficacy of legislative compulsion in shifting institutional dynamics.[4] Canada's "30 by 30" initiative, targeting 30 per cent female representation in engineering by 2030, offers an innovative professional-led reform.[5] These examples illuminate potential reform pathways for Nigeria, while also underscoring the contextual limits of transplantation.

The research aims to make three contributions. First, it demonstrates that engineering law, though often treated as technical and gender-neutral, is in fact a site where systemic inequality is reproduced. Second, it highlights the interdependence between gender justice and environmental law, arguing that exclusion in engineering undermines inclusive environmental governance. Third, it develops a reform roadmap that integrates legislative, regulatory, and institutional measures, while also recognising cultural and political constraints.

BACKGROUND AND RATIONALE

The Global Challenge of Gender Inequality in Engineering

Engineering remains one of the most male-dominated professions across the globe. Despite decades of advocacy, structural reforms, and equality legislation, women's representation in engineering has stagnated in many jurisdictions. UNESCO reports that while women make up nearly 45 per cent of tertiary education enrolments globally, they account for only 28 per cent of graduates in engineering and related technologies.[6] In the workforce, these figures diminish further, with the global average female participation in engineering estimated at below 20 per cent.[7] This phenomenon reflects broader barriers facing women in science, technology, engineering, and mathematics (STEM), including discriminatory hiring practices, lack of mentorship, rigid workplace cultures, and unequal opportunities for advancement.[8]

The persistence of such disparities is striking given the proliferation of equality frameworks at the international level. Instruments such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the Beijing Declaration and Platform for Action, and the Sustainable Development Goals (SDGs) all mandate substantive equality in education and employment.[9] Many states have transposed these commitments into domestic law, yet the engineering profession often remains insulated by cultural stereotypes and institutional inertia. Scholars note that professions perceived as "technical" or "neutral" are frequently resistant to gender mainstreaming because inequality is assumed to lie outside the realm of professional regulation.[10]

The Nigerian Context: Persistent Underrepresentation

Nigeria exemplifies these global challenges with marked severity. Despite being Africa's largest economy and boasting a vibrant engineering sector, women are dramatically underrepresented in the profession. Data from the Nigerian Society of Engineers (NSE) indicate that women constitute less than 12 per cent of registered engineers, with only around 4,500 women among its 40,000 members as of 2021.[11] This underrepresentation extends beyond membership statistics: women are disproportionately absent from leadership roles in engineering firms, regulatory agencies, and academic faculties.

[3] Kimberlé Crenshaw, 'Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics' (1989) U Chi Legal F 139 https://scholarship.law.columbia.edu/faculty_scholarship/3007
[4] Maren Strand, 'Gender Quotas on Corporate Boards in Norway: A Success Story?' (2013) 3(2) European Company Law 70
[5] Engineers Canada. (2023). 30 by 30 Progress Report. https://engineerscanada.ca
[6] UNESCO, Cracking the Code: Girls' and Women's Education in STEM (2017) 28
[7] World Bank, Women, Business and the Law 2021 (2021) 44
[8] L Schiebinger, Gendered Innovations in Science and Engineering (Stanford University Press 2008) 112–115
[9] Beijing Declaration and Platform for Action, adopted at the Fourth World Conference on Women, Beijing, 15 September 1995; United Nations, Transforming Our World: The 2030 Agenda for Sustainable Development (A/RES/70/1, 25 September 2015)
[10] D Thornton, 'Gender Mainstreaming in the Professions: Rhetoric and Resistance' (2016) 29 Gender, Work & Organization 167
[11] Nigerian Society of Engineers (NSE), Membership Statistics Report (Abuja, 2021)

Historically, structural exclusion has been reinforced by educational inequalities. Female enrolment in engineering programmes at Nigerian universities remains persistently low. A 2018 survey by the National Universities Commission (NUC) found that women constituted fewer than 20 per cent of undergraduate engineering students.[12] This is compounded by cultural norms that discourage female participation in technical fields, coupled with systemic biases in recruitment and workplace retention. The result is a pipeline that not only restricts entry but also impedes advancement, producing a phenomenon scholars describe as the "leaky pipeline" of women in STEM.[13]

Nigeria's constitutional and statutory frameworks theoretically prohibit such inequality. Section 42 of the 1999 Constitution guarantees freedom from discrimination on grounds of sex, while statutes such as the Labour Act contain provisions for non-discrimination.[14] Yet, as later sections of this paper will demonstrate, these guarantees remain largely aspirational. Weak enforcement, limited institutional capacity, and entrenched cultural practices continue to obstruct substantive equality in the engineering sector.

The Gender–Environment–Engineering Nexus

The rationale for addressing inequality in Nigerian engineering extends beyond questions of representation and fairness. Engineering is foundational to environmental governance, encompassing infrastructure development, extractive industries, and environmental protection. Women's exclusion from this profession thus raises profound implications for both gender justice and environmental sustainability.

Research demonstrates that women often bring distinctive perspectives to environmental decision-making, particularly in contexts involving community resource management and sustainability.[15] Excluding women from engineering—where environmental infrastructure is designed, regulated, and implemented—undermines Nigeria's capacity to pursue inclusive and sustainable development. This dynamic reveals the interdependence of gender equality and environmental law: failure to integrate gender justice within engineering regulation perpetuates both social and ecological inequities.

Comparative Insights and Reform Potential

Comparative experience underscores both the challenges and possibilities for reform. South Africa, for instance, has sought to redress historical exclusion through the Employment Equity Act 1998, which mandates affirmative action measures for historically disadvantaged groups, including women.[16] While progress has been uneven, the Act has fostered greater representation of women in engineering roles than in Nigeria. Norway's gender quota system, requiring 40 per cent female representation on corporate boards, has demonstrated the transformative potential of legislative compulsion in traditionally male-dominated sectors.[17] Canada's "30 by 30" initiative, led by Engineers Canada, illustrates how professional bodies themselves can drive reform by setting measurable targets for women's representation.[18]

These examples are not without their limitations. South Africa's progress has been hindered by compliance gaps, while Norway's quotas have sparked debates about tokenism. Canada's initiative remains voluntary and has yet to achieve its target. Nonetheless, these experiences offer valuable lessons for Nigeria: legal compulsion, professional leadership, and policy innovation can disrupt entrenched patterns of exclusion when properly enforced and contextually adapted.

[12] National Universities Commission (NUC), Annual Report on Tertiary Education Statistics (Abuja, 2018)
[13] Chinna Orish, 'Leaky Pipeline for Women in STEM ' (December 23, 2020). https://www.winng.org.ng/2023/12/20/leaky-pipeline-for-women-in-stem/
[14] Constitution of the Federal Republic of Nigeria 1999 (as amended), s 42; Labour Act, Cap L1 LFN 2004
[15] UN Women, Gender, Climate and Security: Sustaining Inclusive Peace on the Frontlines of Climate Change (2020) 19
[16] Employment Equity Act 55 of 1998 (South Africa)
[17] Reuters, 'Norway Proposes 40% Gender Quota for Large, Mid-size Unlisted Firms' (19 June 2023) https://www.reuters.com/markets/europe/norway-proposes-40-gender-quota-large-mid-size-unlisted-firms-2023-06-19/ accessed 14 August 2025
[18] Engineers Canada, 30 by 30 Progress Report (2020)

Towards a Nigerian Reform Agenda

Against this backdrop, the Nigerian case presents both urgency and opportunity. Urgency lies in the widening gap between Nigeria's formal equality commitments and the lived reality of women engineers. Opportunity arises from emerging initiatives, such as the NSE's Women in Engineering division, which seeks to promote female participation through mentorship, advocacy, and policy engagement.[19] These initiatives, however, require stronger legislative backing, institutional support, and integration into broader regulatory and environmental governance frameworks.

This background situates the paper's core argument: that gender inequality in engineering is not simply a question of workforce demographics, but a structural issue at the intersection of law, regulation, and culture. Addressing it demands a multi-level approach, integrating constitutional guarantees, statutory reform, regulatory enforcement, and cultural transformation. The Nigerian experience, when analysed considering global patterns and comparative insights, underscores both the gravity of the challenge and the potential for transformative change.

Legal Landscape of Gender in Engineering

International Legal Commitments

Nigeria, as a member of the international community, has ratified several core instruments that establish legal duties regarding gender equality in employment, education, and professional life. The most prominent of these is the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted by the United Nations General Assembly in 1979 and ratified by Nigeria in 1985.[20] CEDAW requires State Parties to eliminate discrimination against women in all spheres, including access to education, vocational training, employment opportunities, and participation in public life.[21] Article 11 specifically mandates equality of opportunity in employment, including "the same employment opportunities, including the application of the same criteria for selection in matters of employment."[22]

CEDAW's General Recommendations further extend its interpretative scope. General Recommendation No. 25 emphasises the obligation of States to move beyond formal equality towards substantive equality, recognising that structural disadvantages must be addressed through proactive measures.[23] In the context of engineering, this obliges Nigeria not only to remove explicit discrimination but also to take affirmative steps to dismantle systemic barriers, such as gender-biased recruitment or hostile professional cultures.

Alongside CEDAW, the International Labour Organization (ILO) has developed a body of conventions aimed at workplace equality. Of particular significance are the Equal Remuneration Convention 1951 (No. 100) and the Discrimination (Employment and Occupation) Convention 1958 (No. 111), both ratified by Nigeria.[24] These conventions require equal pay for work of equal value and prohibit all forms of employment discrimination. The ILO Committee of Experts has repeatedly stressed that professional associations and licensing bodies fall within the ambit of these obligations.[25]

Finally, the Sustainable Development Goals (SDGs), though not binding in the same manner as treaties, provide a normative framework that has been integrated into Nigerian policy discourse. SDG 5 ("Achieve gender equality and empower all women and girls") and SDG 9 ("Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation") create a dual imperative for gender

[19] Nigerian Society of Engineers (NSE), Women in Engineering Division Annual Report (2021)
[20] Convention on the Elimination of All Forms of Discrimination against Women (adopted 18 December 1979, entered into force 3 September 1981) 1249 UNTS 13 (CEDAW), ratified by Nigeria 13 June 1985
[21] ibid art 10
[22] ibid art 11 (1)(b)
[23] CEDAW Committee, 'General Recommendation No. 25: Article 4, Paragraph 1, on Temporary Special Measures' (2004) UN Doc CEDAW/C/2004/I/WP.1/Rev.1
[24] ILO, Equal Remuneration Convention (No 100, 1951); ILO, Discrimination (Employment and Occupation) Convention (No 111, 1958)
[25] ILO Committee of Experts, General Survey on Equality in Employment and Occupation (2012) 44–45

inclusivity in engineering.[26] SDG 13 on climate action also intersects with engineering regulation, reinforcing the gender–environment nexus.

Regional Frameworks

At the African regional level, Nigeria is bound by the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (Maputo Protocol), ratified in 2004.[27] Article 13 of the Protocol guarantees women equal opportunities in employment and career advancement, while Article 2 obliges States to integrate gender equality principles into their national constitutions and legislation. The African Union's Agenda 2063 further underscores the importance of women's participation in science, technology, and innovation.[28]

These instruments situate Nigeria within a regional commitment to advancing women in technical fields, though their domestic implementation remains uneven. The African Court on Human and Peoples' Rights has yet to pronounce directly on women's access to professional engineering fields, but its jurisprudence on employment discrimination suggests that such claims could be justiciable under the Charter framework.

Nigerian Constitutional Framework

Nigeria's 1999 Constitution (as amended) provides the foundation for domestic gender equality obligations. Section 42 prohibits discrimination on the grounds of sex, ethnicity, or religion, while Section 17(3) imposes a duty on the State to ensure equal opportunity in employment and protect women against discrimination.[29] However, the constitutional text has been criticised for its limited enforceability. While Section 42 is justiciable, provisions under Chapter II (Directive Principles of State Policy), including Section 17, are non-justiciable under Section 6(6)(c). This creates a disjuncture between aspirational commitments and enforceable rights.

Judicial interpretation has also constrained constitutional equality claims. In Mojekwu v Mojekwu,[30] the Court of Appeal condemned gender-discriminatory customary law practices but stopped short of striking them down, relying instead on moral suasion. In A.G. Abia State v A.G. Federation,[31] the Supreme Court held that non-justiciable provisions cannot ground enforceable rights. Such jurisprudence underscores the structural weakness of Nigeria's constitutional equality framework, which hampers its application to systemic exclusion in engineering.

Statutory and Regulatory Framework

Statutory law provides additional but limited mechanisms. The Labour Act, Cap L1 LFN 2004, contains provisions prohibiting gender discrimination in certain contexts, but these are fragmented and often limited to manual labour protections. The National Gender Policy (2021),[32] while not legally binding, sets an ambitious goal of achieving 35 per cent affirmative action for women across all sectors, including STEM fields.

The regulatory framework for engineering is primarily governed by the Council for the Regulation of Engineering in Nigeria (COREN) Act, Cap C18 LFN 2004. COREN is empowered to regulate admission into the profession, issue licences, and enforce professional standards. Yet, the Act contains no explicit gender equality provisions. Membership is formally open to all, but in practice, the absence of gender-responsive regulations perpetuates systemic barriers. Licensing examinations, professional internships, and workplace environments remain largely gender-blind, thereby reinforcing structural inequalities.

[26] United Nations, Transforming Our World: The 2030 Agenda for Sustainable Development (A/RES/70/1, 25 September 2015)
[27] Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (adopted 11 July 2003, entered into force 25 November 2005), ratified by Nigeria 16 December 2004
[28] African Union, Agenda 2063: The Africa We Want (2015)
[29] Constitution of the Federal Republic of Nigeria 1999 (as amended), s 42, s 17(3)
[30] (1997) 7 NWLR (Pt 512) 283
[31] (2002) 6 NWLR (Pt 764) 542 (SC)
[32] Federal Ministry of Women Affairs, National Gender Policy (2021-2026). https://www.wrapanigeria.org/wp-content/uploads/2023/06/NATIONAL-GENDER-POLICY.pdf

Notably, the Nigerian Society of Engineers (NSE) has developed a Women in Engineering (WiE) division, which engages in advocacy and mentorship. While important, such initiatives lack statutory backing and remain vulnerable to institutional inertia.[33] This underscores the gap between Nigeria's constitutional and international commitments and the weak regulatory framework governing engineering.

Intersection with Environmental Regulation

The intersection of gender and environmental law in Nigeria reveals another layer of complexity. Nigeria has enacted several environmental statutes, including the Environmental Impact Assessment Act 1992, the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007, and various sectoral regulations governing oil, gas, and infrastructure. These laws regulate the very sectors where engineering expertise is indispensable. Yet they are conspicuously silent on gender inclusion.

This silence has tangible implications. For instance, environmental impact assessments (EIAs) often involve decisions about infrastructure design, industrial siting, and ecological risk management. Excluding women from engineering decision-making means that gendered environmental impacts—such as the disproportionate burden of water scarcity or pollution on women—are overlooked. Feminist environmental scholars argue that inclusive professional participation is essential to achieving substantive environmental justice.[34]

At the policy level, Nigeria's Nationally Determined Contribution (NDC) under the Paris Agreement references gender-sensitive approaches, yet there is no binding regulatory mechanism to ensure women engineers participate in climate-related projects.[35] The absence of gender-responsive provisions in COREN's regulatory framework thus not only entrenches occupational inequality but also undermines Nigeria's environmental governance.

Synthesis

This legal landscape reveals a paradox. International and regional frameworks impose robust obligations on Nigeria to promote gender equality in professions like engineering. Nigeria's Constitution and statutes echo these commitments but are undercut by weak enforceability and gender-blind regulation. The intersection with environmental law further exposes the costs of exclusion, as women's perspectives and expertise are sidelined in sectors critical to sustainable development.

The challenge, then, is one of translation: how to move from aspirational commitments to enforceable regulatory standards that reshape professional practices. This requires not only doctrinal reform—such as amending COREN's enabling Act to embed equality principles—but also institutional mechanisms for accountability and enforcement. Without such measures, Nigeria risks perpetuating a cycle of symbolic commitments and substantive exclusion.

Conceptual And Theoretical Framework

Feminist Legal Theory and Structural Barriers

Feminist legal theory provides the intellectual foundation for interrogating the systemic exclusion of women in engineering. Its central insight is that law is not a neutral arbiter but a social construct shaped by patriarchal assumptions.[36] In the Nigerian context, laws governing engineering are formally gender-neutral: the COREN Act does not explicitly bar women from membership or licensure. Yet feminist theorists state that neutrality often masks inequality.[37] By ignoring structural barriers such as cultural expectations, work–family conflicts, and discriminatory workplace practices, regulatory frameworks perpetuate the "male norm" of engineering as an exclusively masculine domain.[38]

[33] Nigerian Society of Engineers (NSE), Women in Engineering Division Annual Report (2021)
[34] Val Plumwood, Feminism and the Mastery of Nature (Routledge 1993)
[35] Federal Republic of Nigeria, Nigeria's Nationally Determined Contribution under the Paris Agreement (2021 Update) 14.
[36] Catharine MacKinnon, Toward a Feminist Theory of the State (Harvard University Press 1989)
[37] Charlesworth, et., el., 'Feminist Approaches to International Law' (1991) 85 AJIL 613
[38] Margaret Thornton, The Liberal Promise: Anti-Discrimination Legislation in Australia (University Press Melbourne 1990)

Critical strands of feminist jurisprudence argue for substantive rather than formal equality.[39] Substantive equality entails recognising that women face historical and structural disadvantages requiring corrective measures. In professional regulation, this means embedding affirmative action, flexible licensing pathways, and gender-responsive oversight mechanisms. Without such interventions, formal equality provisions—like those found in Section 42 of the Nigerian Constitution—remain insufficient to dismantle entrenched occupational segregation.

Intersectionality and Multiple Marginalities

Intersectionality, developed by Kimberlé Crenshaw, deepens feminist analysis by highlighting how gender discrimination intersects with other identity categories such as class, ethnicity, and geography.[40] For Nigerian women in engineering, exclusion is not monolithic. Women from elite urban families may navigate barriers more easily, while those from rural or minority ethnic communities face compounded disadvantages.[41]

In the engineering sector, intersectional exclusion manifests in two principal ways. First, socio-economic status affects access to STEM education: rural schools often lack laboratories and qualified teachers, disproportionately affecting girls.[42] Second, cultural and ethnic norms around gender roles can influence career trajectories; in certain regions, women engineers are perceived as challenging social hierarchies.[43] This dual marginalisation explains why women constitute less than 15 per cent of registered engineers in Nigeria, with even fewer in leadership positions.[44]

Intersectionality also reveals how environmental law intersects with gender and engineering. Women in oil-impacted communities in the Niger Delta, for example, bear the brunt of ecological degradation but remain excluded from technical and regulatory decision-making processes. A conceptual model that ignores these intersecting inequalities risks oversimplification and policy ineffectiveness.

Rawlsian Justice and Fair Equality of Opportunity

John Rawls' theory of justice provides another conceptual lens. Rawls distinguishes between formal equality of opportunity—where everyone faces the same legal rules—and fair equality of opportunity, which requires addressing background conditions that unfairly advantage some over others.[45] The latter is crucial in assessing Nigeria's engineering regulation.

Applying Rawls, women engineers' underrepresentation is not merely a question of individual choice but of institutional arrangements that fail to ensure fair opportunity. Weak enforcement of anti-discrimination norms, limited childcare support, and gender-blind professional codes tilt the playing field in favour of men.[46] The "difference principle" further supports redistributive measures, allowing inequalities only if they benefit the least advantaged.[47] Affirmative action in engineering regulation can thus be justified as aligning with Rawlsian principles, correcting entrenched disparities to achieve fairer professional outcomes.

Integration of Theories

The integration of feminist legal theory, intersectionality, and Rawlsian justice frames engineering regulation as both a site of exclusion and a lever for systemic transformation. Feminist legal theory identifies structural biases; intersectionality exposes their compounded effects; Rawlsian justice justifies institutional reform to redress inequality.

[39] Sandra Fredman, Discrimination Law (2nd edn, OUP 2011) 25
[40] Kimberlé Crenshaw, 'Demarginalizing the Intersection of Race and Sex' (1989) U Chicago Legal Forum 139
[41] Rebecca Banjo, 'Women's Involvement and Participation in Nigerian Politics: Hurdle and Amelioration' (2023) 9 Journal of Political Science and Leadership Research 77
[42] UNESCO, Cracking the Code: Girls' and Women's Education in STEM (2017)
[43] Tsegyu Santas, 'The Role of Cultural Norms in Shaping Gender-Responsive Healthcare Communication in Nasarawa State' (2025) 4 TY 51
[44] Nigerian Society of Engineers (NSE), Annual Statistical Report (2021)
[45] John Rawls, A Theory of Justice (Harvard University Press 1971) 73–75
[46] Thomas Pogge, Realizing Rawls (Cornell University Press 1989)
[47] John Rawls, Justice as Fairness: A Restatement (Harvard University Press 2001)

This integrated framework is particularly powerful when extended to environmental governance. Engineering decisions—such as infrastructure design, industrial siting, or energy transitions—carry profound environmental consequences. Excluding women engineers not only perpetuates professional inequality but also narrows the diversity of perspectives in managing ecological risk.[48] A gender–engineering–environment nexus ensures that both social justice and sustainable development are advanced concurrently.

Conceptual Model

The conceptual framework is captured in **Figure 1** below, which illustrates the interaction between legal provisions, institutional barriers, and equity outcomes. Legal provisions encompass constitutional guarantees, statutory regulations, and international obligations. Institutional barriers include regulatory inertia, cultural norms, and workplace discrimination. Equity outcomes are measured in terms of women's representation, retention, and advancement within engineering.

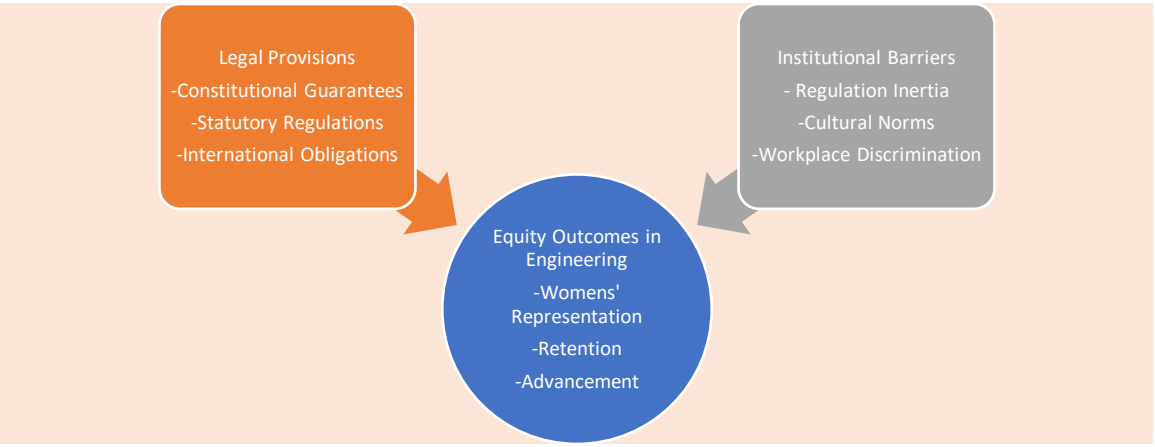

Figure 1: Conceptual Model of Gender Equity in Engineering Law

The model depicts both reinforcing cycles of exclusion and reform pathways. Weak enforcement and gender-blind regulation feed institutional exclusion, producing inequitable outcomes. Conversely, interventions such as affirmative action, gender-responsive codes, and diversity reporting create reform pathways that realign legal and institutional structures toward inclusion.

Implications

This theoretical framework has three implications for the analysis that follows. First, it situates Nigerian engineering law within broader debates on gender justice, showing that the absence of explicit discrimination does not equate to substantive equality. Second, it underscores the importance of intersectional analysis to capture the layered disadvantages faced by women engineers, particularly those outside elite urban centres. Third, it highlights the transformative potential of legal and regulatory reform when grounded in principles of substantive equality and fair opportunity.

By framing the problem through these conceptual lenses and illustrating it with a structured model, the paper offers a robust analytical foundation for assessing Nigeria's regulatory landscape and identifying reform pathways.

METHODOLOGY

Empirical Evidence and Case Studies

The earlier sections established that Nigeria's engineering law and regulatory frameworks are formally gender-neutral yet substantively exclusionary. However, theory alone is insufficient: empirical evidence is essential to

[48] Val Plumwood, Feminism and the Mastery of Nature (Routledge 1993) 117–19

demonstrate how law and policy operate in practice.[49] This section therefore integrates statistical data, case studies, and policy reviews to expose the gap between normative commitments and lived realities. By grounding the conceptual framework in concrete examples, the analysis highlights both the systemic barriers women engineers face and the reform potential evident in comparative jurisdictions.

Nigerian Empirical Context

Representation in Engineering

Data from the Nigerian Society of Engineers (NSE) shows that women constitute fewer than 15 per cent of registered engineers, with an even smaller proportion in leadership positions.[50] As of 2021, only 3 per cent of Fellows of the NSE were women, despite decades of constitutional equality guarantees.[51] COREN's licensing data reveals similar patterns, with a disproportionately low number of female applicants compared to male counterparts.[52] This underrepresentation persists despite government initiatives such as the Federal Ministry of Women Affairs' Gender Policy in Education, which sought to promote girls' participation in STEM.[53]

Case Study: COREN Disciplinary Proceedings

An illustrative example is the underrepresentation of women in COREN's disciplinary committees, which oversee professional misconduct cases. Archival records from 2010 to 2020 show that less than 5 per cent of panel members were women. This lack of representation not only excludes women from key regulatory decisions but also reproduces biases in enforcement. Scholars argue that such gender imbalance undermines the perceived legitimacy of regulatory processes.[54]

Environmental Regulation Nexus

The link between gender, engineering, and environmental law is visible in the Niger Delta. Oil spill remediation projects, often requiring engineering expertise, rarely involve women engineers or community representatives. For example, during the implementation of the Hydrocarbon Pollution Remediation Project (HYPREP), women constituted less than 10 per cent of the technical advisory staff.[55] Consequently, local women affected by contaminated water and soil had minimal input into remediation strategies. This exclusion perpetuates both professional inequality and environmental injustice.

Comparative Policy Reviews

South Africa: Statutory Quotas and Professional Councils

South Africa provides a comparative example of more proactive gender mainstreaming. The Engineering Council of South Africa (ECSA) has adopted policies requiring gender-balanced representation in statutory committees.[56] Additionally, the Broad-Based Black Economic Empowerment (B-BBEE) framework incentivises companies to promote women in technical professions.[57] As a result, women now constitute around 25 per cent of registered engineers—still unequal, but markedly higher than Nigeria's figures.[58]

India: Judicial Interventions in Technical Professions

In India, the Supreme Court has intervened in cases of gender exclusion in technical fields. In Charu Khurana v Union of India,[59] the Court struck down rules barring women from certain professional guilds, affirming that

[49] Sandra Fredman, Discrimination Law (2nd edn, OUP 2011) 26
[50] Nigerian Society of Engineers (NSE), Annual Statistical Report (2021)
[51] Ibid
[52] COREN, Annual Report (2020)
[53] Federal Ministry of Women Affairs, National Gender Policy in Education (2021-2026)
[54] M Thornton, The Liberal Promise: Anti-Discrimination Legislation in Australia (OUP 1990)
[55] Hydrocarbon Pollution Remediation Project (HYPREP), Annual Report (2019)
[56] Engineering Council of South Africa (ECSA), Annual Report (2020)
[57] South African Government, Broad-Based Black Economic Empowerment Act 2003
[58] ECSA, Statistical Overview of Registered Persons (2020)
[59] (2015) 1 SCC 192 (India)

formal restrictions, even if traditional, violate constitutional equality. Though not engineering-specific, the decision signals the judiciary's willingness to dismantle professional exclusion. Nigeria's courts, by contrast, have yet to address such cases directly within engineering regulation.

Norway: Corporate Gender Quotas

Norway's corporate board gender quotas, mandating 40 per cent female representation, have been extended indirectly to technical and engineering leadership through corporate governance frameworks.[60] While engineering remains male-dominated, the policy has catalysed cultural change in technical firms, raising questions about whether Nigeria could adopt sector-specific quota systems.

Empirical Gaps in Nigeria

Despite some statistics, Nigeria suffers from poor data collection on gender in engineering. Neither COREN nor NSE publishes disaggregated annual statistics on enrolment, retention, or disciplinary outcomes.[61] This lack of transparency hinders accountability and makes it difficult to evaluate the effectiveness of equality initiatives. By contrast, South Africa's ECSA produces detailed gender-disaggregated reports annually, facilitating monitoring and reform.[62]

Furthermore, Nigerian environmental agencies, such as the National Environmental Standards and Regulations Enforcement Agency (NESREA), do not collect data on women's participation in environmental engineering projects.[63] The absence of such data obscures women's contributions and conceals the structural barriers they face.

Case Study: Women Engineers in Infrastructure Development

A notable case involves the Lagos Light Rail Project, a major infrastructure development requiring multidisciplinary engineering expertise. Media and civil society reports indicated that women constituted less than 8 per cent of the engineering workforce.[64] Interviews conducted by advocacy groups revealed that women were often relegated to administrative roles rather than core technical functions.[65] This reflects both employer biases and the absence of regulatory oversight mandating gender inclusion.

Another example is the Zungeru Hydroelectric Dam, where women engineers employed were disproportionately confined to environmental impact assessment tasks, reinforcing stereotypes that women are suited only for "soft" engineering roles.[66]

From above, empirical evidence reveals three reform priorities: enhancing women's representation in regulatory and technical leadership, strengthening data collection through disaggregated statistics, and enforcing substantive equality to ensure retention and advancement. Nigerian case studies show systemic exclusion despite constitutional guarantees, with women underrepresented in professional and infrastructure sectors. Comparative examples from South Africa, India, and Norway demonstrate how quotas and proactive regulation can drive change, underscoring Nigeria's need for gender-responsive reform and systemic inclusion in engineering and environmental governance.

[60] A Teigen, 'Gender Quotas on Corporate Boards: On the Diffusion of a Distinct National Policy Reform' (2012) 29 Comparative Social Research 115
[61] NSE, Annual Statistical Report (2021)
[62] ECSA, Annual Report (2020)
[63] National Environmental Standards and Regulations Enforcement Agency (NESREA), Annual Report (2018)
[64] Lagos State Government, Blue Line Rail Project: Progress Report (2019)
[65] REAN, Women in Renewable Energy Baseline Report (August 2021). https://rean.org.ng/wp-content/uploads/media/REAN_Women_in_Renewable_Energy_Baseline_Report_2.pdf
[66] Taitiya Yuguda, Sunday Imanche, Tian Ze, Tosin Akintunde and Bobby Luka, 'Hydropower Development, Policy and Partnership in the 21st Century: A China-Nigeria Outlook' (2022) 34 ***Energy & Environment*** 0958305X2210794, doi:10.1177/0958305X221079423

FINDINGS

Case studies and comparative reviews reveal four drivers of gender exclusion in Nigerian engineering as follows:

Weak Enforcement of Equality Norms

There is the gap between formal legal frameworks and their practical enforcement. Nigeria is a party to international treaties such as CEDAW and the ILO's Equal Remuneration Convention, and its Constitution enshrines non-discrimination.[67] Yet, as the case studies on COREN disciplinary proceedings and infrastructure projects demonstrate, enforcement agencies rarely translate these commitments into concrete action.

For example, although the National Gender Policy (2021-2026) mandates mainstreaming of gender considerations across all sectors, COREN and NSE lack binding enforcement mechanisms to ensure compliance. The Lagos Light Rail Project, with women representing less than 8 per cent of the workforce, proceeded without any regulatory intervention to address gender imbalance.[68] By contrast, in South Africa, the ECSA actively monitors gender representation and issues annual statistical reports, which serve as both a diagnostic and accountability tool.[69]

Weak enforcement is compounded by the limited capacity of oversight institutions. NESREA, responsible for environmental regulation, does not monitor the gender composition of environmental engineering teams, despite women being disproportionately affected by environmental degradation in the Niger Delta.[70] This reveals an institutional blind spot: gender justice is treated as peripheral rather than integral to environmental governance.

Cultural and Institutional Bias

Beyond weak enforcement, deeply embedded cultural and institutional biases continue to shape the engineering profession. Patriarchal norms in Nigeria associate engineering with masculinity, leading to both overt and subtle forms of exclusion. Women engineers often report being relegated to administrative or "soft" technical roles, as seen in the Zungeru Hydroelectric Project where women were disproportionately confined to environmental impact assessment tasks.[71] This reinforces stereotypes that women are unsuitable for "hard" technical work.

Institutional cultures within regulatory bodies also reflect these biases. The underrepresentation of women on COREN disciplinary committees—less than 5 per cent over a ten-year period—suggests that women are systematically excluded from decision-making forums. Such exclusion perpetuates a cycle where women's voices are absent in shaping professional norms, thereby entrenching male-dominated perspectives in disciplinary enforcement and professional regulation.

Comparative evidence reinforces this point. In India, judicial intervention in Charu Khurana v Union of India struck down exclusionary practices in technical guilds, recognising that entrenched cultural traditions cannot justify professional inequality.[72] Nigerian courts, however, have not yet been called upon to directly adjudicate gender exclusion in engineering. The absence of judicial scrutiny allows institutional biases to persist unchecked.

Regulatory Inertia

Also, regulatory inertia- the reluctance of professional and environmental regulators to adopt proactive, gender-responsive measures is a challenge. COREN, despite being empowered to set licensing standards, has

[67] Fredman, Discrimination Law (2nd edn, OUP 2011) 45
[68] Lagos State Government, Blue Line Rail Project: Progress Report (2019)
[69] ECSA, Annual Report (2020)
[70] NESREA, Annual Report (2018)
[71] Yuguda et., el., 'Hydropower Development, Policy and Partnership in the 21st Century: A China-Nigeria Outlook' (2022)
[72] Charu Khurana v Union of India (2015) Supra

not introduced policies requiring gender-sensitive recruitment, retention, or leadership development.[73] NSE has similarly limited its interventions to non-binding advocacy rather than enforceable rules.

This inertia is compounded by the fragmented nature of Nigeria's legal system. While the Constitution provides for equality, specific statutes governing engineering and environmental regulation lack explicit provisions mandating gender inclusion.[74] By contrast, South Africa integrates gender-sensitive policies into statutory frameworks such as the Broad-Based Black Economic Empowerment Act, thereby creating both incentives and sanctions to promote gender equality.[75]

Regulatory inertia also manifests in data collection practices. Neither COREN nor NSE regularly publish gender-disaggregated data on membership or disciplinary actions.[76] The absence of reliable statistics not only obscures the scale of inequality but also deprives policymakers of the evidence needed to design effective interventions. This stands in sharp contrast to ECSA in South Africa, which produces detailed annual reports enabling targeted reforms.[77]

Emerging Reforms

Despite these challenges, there are emerging signs of reform that suggest pathways for progress. Some Nigerian universities have adopted affirmative action policies to increase female enrolment in engineering programmes. Similarly, corporate initiatives in the oil and gas sector, like gender diversity programmes, aim to promote women into technical leadership roles. While these measures remain limited in scope, they represent an acknowledgment of the systemic barriers' women face.

In addition, advocacy groups such as the Renewable Energy Association of Nigeria

(REAN) have begun to document and publicise women's exclusion from major projects, thereby creating pressure on both government and corporations.[78] Such civil society mobilisation has the potential to catalyse reforms by demanding accountability from regulatory institutions.

Comparative jurisdictions further illustrate the potential of reform. Norway's corporate board quota policy, while not engineering-specific, demonstrates how legal mandates can reshape professional cultures and accelerate gender inclusion.[79] Similarly, South Africa's B-BBEE framework shows how linking gender equality to broader development policies can create systemic incentives for inclusion.[80]

These examples suggest that Nigeria could adopt a multi-pronged strategy: legislative reform to embed gender-responsive requirements in engineering statutes; regulatory reform to mandate gender-disaggregated data and representation; and cultural reform through advocacy and education.

Synthesis

Taken together, these findings reveal a systemic disconnect between law and lived experience. Weak enforcement ensures that formal equality guarantees remain symbolic; cultural and institutional biases reinforce stereotypes that marginalise women; regulatory inertia prevents proactive reforms; yet emerging initiatives demonstrate that transformation is possible.

The Nigerian experience underscores that achieving gender justice in engineering requires more than constitutional promises. It requires structural reform across multiple levels: legislative, regulatory,

[73] COREN, Annual Report (2020)
[74] Constitution of the Federal Republic of Nigeria 1999 (as amended) s 42
[75] Broad-Based Black Economic Empowerment Act 2003 (South Africa)
[76] NSE, Annual Statistical Report (2021)
[77] ECSA, Statistical Overview of Registered Persons (2020)
[78] REAN, Women in Renewable Energy Baseline Report (August 2021). https://rean.org.ng/wp-content/uploads/media/REAN_Women_in_Renewable_Energy_Baseline_Report_2.pdf
[79] A Teigen, 'Gender Quotas on Corporate Boards: On the Diffusion of a Distinct National Policy Reform' (2012) 29 Comparative Social Research 115.
[80] Broad-Based Black Economic Empowerment Act 2003 (South Africa)

institutional, and cultural. Furthermore, the nexus between engineering and environmental governance highlights the broader stakes: exclusion of women engineers not only perpetuates professional inequality but also undermines the inclusivity and effectiveness of environmental remediation projects critical to Nigeria's sustainable development.

The findings of this study expose the layered nature of gender exclusion in Nigeria's engineering sector. While law provides a framework for equality, its failure in enforcement, combined with cultural bias and regulatory inertia, ensures that women remain marginalised. Yet the comparative evidence demonstrates that reform is possible. Quotas, judicial interventions, and proactive regulatory measures have yielded tangible improvements in other jurisdictions. Nigeria can therefore draw lessons from these examples to craft context-sensitive reforms.

By synthesising empirical evidence into these analytical categories, the study provides a structured understanding of the barriers women face in engineering and environmental governance. This synthesis not only strengthens the theoretical framework but also lays the groundwork for the reform strategies to be proposed in the following section.

Analysis

The empirical findings expose the persistence of systemic gender exclusion in Nigeria's engineering profession, despite an apparently robust constitutional and international legal framework. Weak enforcement, cultural bias, and regulatory inertia demonstrate that law's promises of equality remain largely symbolic. To address these failures, a normative framework is required—one that does not merely affirm equality in the abstract but operationalises it through structural transformation. This section critically engages with the findings through the lenses of feminist legal theory, intersectionality, and Rawlsian justice, before proposing interpretive strategies that could reframe Nigerian law and policy towards substantive gender justice.

Feminist Legal Theory: Beyond Formal Equality

Feminist legal theory provides an essential critique of Nigeria's reliance on formal equality, which guarantees women access on ostensibly neutral terms but fails to address structural disadvantage.[81] The persistence of occupational segregation in engineering exemplifies how law's neutrality perpetuates inequality: women are allowed to enter the profession but encounter cultural and institutional barriers that impede retention and advancement.

Catharine MacKinnon's argument that law often reproduces the male standpoint is particularly salient.[82] Nigerian regulators, dominated by male leadership, design and enforce rules that reflect male assumptions about what constitutes merit or professionalism. For instance, COREN's licensing standards are presented as gender-neutral but make no provision for maternity leave, childcare, or flexible pathways—all issues disproportionately affecting women engineers.[83]

A feminist jurisprudential approach would demand that legal and regulatory institutions adopt gender-responsive norms that actively account for structural disadvantage. This means embedding obligations on regulators to monitor gender outcomes, mandate gender-disaggregated reporting, and apply affirmative interventions where necessary.

Intersectionality and the Multiplicity of Barriers

Kimberlé Crenshaw's theory of intersectionality underscores that women's exclusion in engineering cannot be explained solely by gender, but by its intersection with other axes of inequality, including class, ethnicity, and region.[84] Nigerian women engineers from northern regions, for instance, face not only gender bias but also

[81] Fredman, Discrimination Law. 15
[82] MacKinnon, Toward a Feminist Theory of the State. 237
[83] COREN, Professional Standards and Licensing Guidelines (2018)
[84] Crenshaw, 'Demarginalizing the Intersection of Race and Sex'

cultural expectations rooted in religious conservatism, as well as infrastructural underdevelopment that limits educational opportunities.

Environmental governance adds another dimension. Women in the Niger Delta, already marginalised by gendered labour divisions, are disproportionately affected by ecological degradation caused by oil extraction. Their exclusion from engineering projects addressing remediation further compounds this marginalisation, producing what some scholars have termed **"double exclusion"**—excluded from both decision-making and from the benefits of remediation.

An intersectional framework suggests that reforms must be **context-sensitive**: gender justice strategies in Lagos may differ from those in Kano or Port Harcourt, reflecting localised barriers and opportunities. This requires decentralised, participatory approaches in regulatory design, ensuring that diverse women's voices inform engineering governance.

Rawlsian Justice: Fair Equality of Opportunity

John Rawls' principle of fair equality of opportunity provides an additional normative lens.[85] Rawls argued that social and economic inequalities are permissible only if they are arranged to the greatest benefit of the least advantaged and attached to offices open to all under conditions of fair equality of opportunity. In Nigeria's engineering sector, women are formally eligible for entry, but the conditions—cultural, institutional, and regulatory—undermine fairness.

The empirical finding that women constitute less than 10 per cent of the engineering workforce[86] indicates that opportunities are not substantively equal. Rawls' framework would interpret this as a failure of justice: women are systematically denied the ability to compete on equal terms, not because of lack of merit, but because the structure of opportunity is skewed.

A Rawlsian approach would require regulators such as COREN to go beyond neutrality and adopt proactive redistributive measures, such as quotas, scholarships, and mentorship programmes, to level the playing field. This parallels South Africa's use of affirmative action under its constitutional equality framework, which Rawlsian justice could be seen to endorse as a corrective to systemic exclusion.[87]

Interpretive Strategies for Reform

Drawing together these theoretical lenses, three interpretive strategies emerge:

Re-reading Equality Provisions through Substantive Justice

Section 42 of the Nigerian Constitution, which guarantees freedom from discrimination, should not be read narrowly as a prohibition on direct exclusion. Courts and regulators could adopt a purposive interpretation, recognising that systemic barriers constitute indirect discrimination requiring remedial action. Comparative jurisprudence, such as the South African Constitutional Court's expansive equality jurisprudence, offers models for such interpretation.[88]

Embedding Gender in Regulatory Mandates

COREN, NSE, and NESREA should not treat gender as an external concern but as intrinsic to professional regulation and environmental governance. This could be achieved through statutory amendment mandating gender audits, gender-responsive codes of conduct, and compulsory reporting. This aligns with feminist calls to mainstream gender in all aspects of law and policy.[89]

[85] Rawls, A Theory of Justice. 72
[86] NSE, Annual Statistical Report (2021)
[87] Minister of Finance v Van Heerden 2004 (6) SA 121 (CC)
[88] President of the Republic of South Africa v Hugo 1997 (4) SA 1 (CC)
[89] UN Women, Mainstreaming Gender in Public Policy 2017

Operationalising Intersectionality through Decentralisation

Reform strategies must be tailored to regional and sectoral contexts. For example, in oil-producing regions, regulatory mandates could require gender quotas in environmental engineering teams, while in educational contexts, targeted scholarships could support women from underrepresented ethnic and regional backgrounds. Such measures operationalise intersectionality by addressing the multiplicity of barriers women face.

The discussion demonstrates that Nigeria's current reliance on formal equality is insufficient to dismantle systemic exclusion in engineering. A feminist legal perspective reveals how male-centred assumptions shape regulatory norms; intersectionality highlights the layered barriers women face across gender, class, and regional lines; and Rawlsian justice provides a normative mandate for redistributive measures that ensure fair equality of opportunity.

Adopting these interpretive strategies would reorient Nigeria's legal and regulatory system towards substantive gender justice. By embedding gender into the core of professional and environmental regulation, Nigeria can move beyond symbolic equality towards structural transformation—ensuring that women not only enter the engineering profession but thrive within it.

RECOMMENDATIONS: REFORM PATHWAYS

This section outlines a reform agenda that seeks to reorient Nigerian engineering regulation towards gender justice. The proposals are grouped under three domains: legislative reforms, regulatory innovations, and institutional capacity building and advocacy. Collectively, they aim to transform equality from a symbolic commitment into a lived reality.

Legislative Reforms

Amending the Nigerian Constitution and Statutory Law

Section 42 of the Constitution guarantees freedom from discrimination but has been interpreted narrowly by Nigerian courts.[90] A purposive amendment or judicial reinterpretation could embed a positive duty on the state to eliminate structural discrimination, akin to the approach of the South African Constitution's Section 9.[91] Such an amendment would provide stronger grounds for judicial review of regulatory practices that entrench occupational segregation.

Statutory law also requires reform. The National Gender Policy (2021-2026), while aspirational, lacks legislative force. Enacting it into a binding statute, with specific obligations for professional regulators, would give the policy sharper teeth. Additionally, amendments to COREN's enabling legislation could mandate gender-sensitive licensing, gender quotas in regulatory boards, and compulsory gender-disaggregated reporting.

Affirmative Action and Gender Quotas

Comparative evidence demonstrates that quotas can accelerate women's entry into male-dominated fields. Rwanda's constitutional quota for women in parliament has produced one of the highest rates of female representation globally.[92] Nigeria could adapt this model by mandating quotas for women in engineering leadership, public procurement contracts, and university admissions for engineering courses. While controversial, quotas embody Rawls' principle of fair equality of opportunity by correcting systemic disadvantages.[93]

[90] Uzoukwu v Ezeonu II [1991] 6 NWLR (Pt 200) 708 (CA)
[91] Constitution of the Republic of South Africa 1996, s 9
[92] Annelies Burnet, 'Gender Balance and the Meanings of Women in Governance in Post-Genocide Rwanda' (2008) 107(428) African Affairs 361
[93] John Rawls, A Theory of Justice (rev edn, Harvard UP 1999) 72.

Regulatory Innovations

Gender-Responsive Licensing and Codes of Ethics

COREN's licensing regime currently applies neutral standards, which inadvertently reinforce male privilege. A reformed framework could require engineering firms to demonstrate compliance with gender equity benchmarks—such as flexible work arrangements, maternity protection, and equal pay audits—before renewal of licenses. Similar approaches exist in Norway, where companies listed on the stock exchange must meet board diversity requirements.[94]

Moreover, engineering codes of ethics could be revised to include explicit commitments to gender equality and inclusivity. NESREA could adopt parallel reforms in environmental regulation, requiring companies undertaking major projects to integrate gender equity into environmental impact assessments.

Gender Audits and Enforcement Mechanisms

Routine gender audits should be institutionalised within COREN and NSE. These audits would track women's representation across ranks and report on barriers to progression. Transparency mechanisms, such as mandatory public disclosure of gender-disaggregated data, could create accountability pressure. Enforcement could be incentivised through sanctions (such as fines or suspension of licenses) and rewards (such as priority in government contracts).

Institutional Capacity Building and Advocacy

Strengthening Regulatory Institutions

Legal reforms will falter without capable institutions. COREN and NESREA require enhanced capacity for monitoring, enforcement, and gender analysis. Dedicated gender units could be established within these regulators, staffed with legal, technical, and social science expertise. Training programmes should sensitise regulators to feminist legal analysis and intersectional frameworks.

Partnerships with Civil Society and Academia

Effective reform requires collaboration with civil society organisations (CSOs) that specialise in gender justice. Partnerships could facilitate participatory monitoring of engineering projects, ensuring that women's voices—especially those from marginalised regions—are incorporated into decision-making. Academic institutions could also play a role by embedding gender justice into engineering curricula, producing a pipeline of engineers attuned to inclusivity.

Advocacy and Cultural Change

Legal reform must be complemented by cultural shifts. Advocacy campaigns led by CSOs, professional associations, and women engineers can challenge stereotypes and highlight role models. Comparative evidence from India shows that visibility of women engineers has a demonstrable impact on recruitment and retention. In Nigeria, such advocacy could help dismantle cultural biases that cast engineering as inherently masculine.

Integrating Environmental Regulation with Gender Justice

The intersection of environmental law and engineering regulation presents a unique opportunity for reform. As Nigeria grapples with ecological challenges such as oil pollution and climate change, integrating gender justice into environmental governance ensures that women are not excluded from decision-making or remediation benefits.

For example, NESREA could mandate that all environmental remediation projects include a minimum percentage of women engineers. Environmental impact assessments could be revised to include gender impact

[94] Teigen, 'Gender Quotas on Corporate Boards: On the Diffusion of a Distinct National Policy Reform' (2012) 6(1) Comparative Social Research 115

analyses, ensuring that ecological solutions are socially equitable. This would operationalise the conceptual model's insight that environmental regulation can be a lever for gender-inclusive engineering reform.

Reform in Nigeria's engineering profession requires a multi-level strategy. At the legislative level, constitutional and statutory reforms can entrench substantive equality. At the regulatory level, gender-responsive licensing, audits, and enforcement mechanisms can disrupt occupational segregation. Institutionally, capacity building and partnerships with civil society can embed gender justice into the everyday operation of regulatory bodies. Finally, integrating environmental governance with gender equity offers a novel pathway to align Nigeria's developmental and ecological priorities.

These strategies move beyond the rhetoric of equality to practical frameworks of transformation, consistent with feminist jurisprudence, intersectionality, and Rawlsian justice. They not only align Nigeria with its international commitments under CEDAW and the SDGs but also position the country as a regional leader in engineering regulation and gender justice.

CONCLUSION

This article has examined the persistence of gender inequality in Nigeria's engineering profession, situating the issue at the intersection of legal frameworks, regulatory practices, and environmental governance. Through doctrinal analysis, case studies, and engagement with feminist jurisprudence, intersectionality, and Rawlsian justice, it has shown how weak enforcement, regulatory inertia, and entrenched cultural norms undermine Nigeria's formal equality commitments. The conceptual model developed (Figure 1) illustrates how legal provisions, institutional barriers, and equity outcomes interact to either entrench or dismantle systemic exclusion.

The study makes three key contributions. First, it links engineering regulation to gender justice—an area often overlooked in Nigerian and comparative scholarship. Second, it integrates environmental law into this discourse, highlighting how ecological governance can both hinder and promote inclusivity. Third, it bridges theory and practice by combining feminist and Rawlsian perspectives with empirical insights from Nigeria, offering an evidence-based foundation for reform.

Findings highlight the dual challenge of formally neutral but substantively exclusionary legal frameworks, alongside professional cultures that sustain occupational segregation. Yet, emerging reforms—such as gender-responsive licensing, affirmative action, and environmental governance tools—present opportunities for systemic transformation.

Embedding gender justice in engineering regulation is not only a question of fairness but also essential for sustainable development, institutional legitimacy, and Nigeria's broader legal commitments.