Beyond Conventional Regulation of Technology Transfer in Cameroon

Chick Nchumi Ndum

PhD Research Scholar., University Of Yaounde Ii-Soa, Cameroon

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ABSTRACT

Conventional approaches to technology transfer regulation, anchored in formal legal instruments such as patent licensing, foreign direct investment and structured technical assistance, have been in the spotlight for decades as the primary channels that enable technology to be transferred, often overlooking informal channels. Much of technological learning, adaptation and diffusion in Cameroon occurs outside formal arrangements, and these processes are unregulated. This article examines informal technology transfer in Cameroon using a doctrinal and qualitative methodology, drawing on legal analysis of Cameroon's statutory instruments, including the Investment Code, the revised Bangui Agreement under OAPI, and copyright legislation, alongside documented sectoral evidence from international development assessments across digital financial services, manufacturing, and the software ecosystem. The study argues that informal transfer mechanisms generate technological capabilities comparable to those produced by formal agreements, particularly through tacit knowledge, embodied skills, and relational learning. Yet, the absence of regulatory oversight creates challenges, including quality inconsistencies, intellectual property uncertainty, and weak alignment with national development strategies. Rather than imposing rigid controls, the article proposes a facilitative regulatory framework that recognizes the developmental value of informality. It advocates for soft law instruments, competency-based certification, and public-private coordination platforms to enhance knowledge circulation and inclusive innovation. Ultimately, the study shifts the focus of technology transfer governance from ownership and enforcement toward absorption, coordination, and facilitation grounded in the realities of informal technological change.

Keywords: Technology transfer, regulation, conventional, formal, informal, technology diffusion, patents, licenses, innovation, Cameroon.

INTRODUCTION

The mechanisms for Technology transfer have historically been grounded in a predominantly formalist conception of how technological knowledge moves across borders. The dominant analytical focus has been on patent licensing agreements, foreign direct investment accompanied by contractual technology transfer clauses, technical assistance arrangements, and university-industry collaborations governed by intellectual property regimes. These mechanisms are widely treated as the primary channels through which developing economies gain access to foreign technologies and associated know-how.[1] Comparative regulatory analysis reinforcing this perspective have largely drawn on OECD and East Asian experiences, often overlooking the institutional constraints, absorptive limitations and structural conditions characteristic of many African economies.[2] As a result, national legal frameworks and international development interventions have tended to prioritize intellectual property protection, formal investment promotion and institutionalized research and development

[1] Saggi, K. (2002). *Trade, foreign direct investment, and international technology transfer: A survey*. World Bank Research Observer, 17(2), 191–235.

[2] Schneider, J. (2024). International technology transfers to Africa in light of the SDGs. *Journal of International Development*, 36(3), 1245–1267.

systems.[3] This emphasis, however, obscures an important empirical reality in developing economies. A substantial body of development and innovation literature demonstrates that technological learning and capability formation frequently occur outside formal contractual arrangements[4] and knowledge is often acquired through labour mobility, apprenticeship systems, supplier-buyer relationships, adaptive imitation, reverse engineering and participation in global and regional value chains.[5] These processes, commonly described as informal or passive technology transfer, play an important role in building productive capabilities, particularly where formal licensing and research infrastructures remain limited.[6] Recent technological developments have further amplified the relevance of informal transfer mechanisms as digital platforms, open-source communities, online learning environments and artificial intelligence-enabled tools have expanded access to technical knowledge and reduced reliance on traditional institutional gatekeepers. The African Union's Continental Artificial Intelligence Strategy explicitly recognizes informal digital learning networks and online communities as key vectors for skills diffusion across the continent.[7] Similarly, the Science, Technology and Innovation Strategy for Africa[8] highlights the growing importance of non-institutional learning pathways in fostering innovation and technological adaptation.[9] International development policy has also increasingly acknowledged this shift, with initiatives such as the United States' Digital Transformation with Africa emphasizing peer-topeer learning, digital skills acquisition and platform-mediated knowledge exchange.[10]

Cameroon illustrates this divergence between legal design and technological practice with particular clarity. Formal technology transfer through licensed acquisition remains limited, with only a small proportion of firms reporting engagement in formal technology licensing arrangements.[11] National expenditure on research and development also remains modest relative to global benchmarks.[12] Yet technological adaptation and innovation are observable across multiple sectors. Digital financial services provide a prominent example: mobile money systems operate through extensive informal agent networks and community-based learning processes, facilitating widespread adoption despite minimal formal technology licensing.[13] In manufacturing and construction, production techniques are frequently learned through observation, apprenticeship, and incremental experimentation rather than formal technical assistance contracts. In the digital economy, entrepreneurs and software developers rely heavily on open-source platforms, online forums, and informal professional networks to acquire and adapt technological skills for local markets.[14]

These patterns of learning are not peripheral to Cameroon's technological development; they constitute its dominant mode. Informal technology transfer is embedded in everyday economic activity through returnee entrepreneurship, transnational social networks, and digitally mediated communities of practice.[15] Nevertheless, the legal framework governing technology transfer, including the revised Bangui Agreement under OAPI, Cameroon's Investment Code, copyright legislation, and emerging continental instruments under the African Continental Free Trade Area, remains overwhelmingly oriented toward formal intellectual property protection and contractual exchange.[16] These instruments address only a narrow segment of the processes through which technological capabilities are actually acquired and diffused. This disconnect raises fundamental regulatory questions. If informal mechanisms represent the principal pathways of technological diffusion, what purpose is served by legal regimes that focus almost exclusively on formal channels? Does regulatory silence preserve flexibility and inclusiveness, or does it create risks in the form of quality uncertainty, weak skill

[3] WIPO. (2019). *Technology transfer, intellectual property and university–industry partnerships*.
[4] Maskus, K. E. (2004). *Encouraging international technology transfer*. ICTSD.
[5] Song, J., Almeida, P., & Wu, G. (2003). *Management Science*, 49(4), 351–365.
[6] Ado, A., & Osabutey, E. L. C. (2025). *Technological Forecasting and Social Change*, 202.
[7] African Union. (2024). *Continental Artificial Intelligence Strategy for Africa*.
[8] U.S. Department of State. (2024). *Digital Transformation with Africa*.
[9] Ibid
[10] U.S. Department of State. (2024). *Digital Transformation with Africa*.
[11] World Bank. (2016). *Enterprise Surveys: Cameroon*.
[12] UNESCO Institute for Statistics. (2021). *UIS.Stat*e.
[13] IMF. (2025). *Digital payment innovations in Sub-Saharan Africa*.
[14] Ndjanyou, L. (2019). *Journal of Small Business and Enterprise Development*, 26(3).
[15] Kamdem, E. (2016). *African Journal of Economic and Management Studies*, 7(4). [16]
WIPO. (2019). *Technology transfer and IP*.

certification, intellectual property disputes, and missed opportunities for coordinated capability building?[16] More broadly, how should legal systems in developing economies respond to a technological landscape increasingly shaped by digital platforms and artificial intelligence-mediated learning?

This article addresses these questions through a doctrinal-observational analysis of informal technology transfers in Cameroon. The doctrinal component involves systematic analysis of Cameroon's existing statutory instruments, including the Investment Code (Law No. 2013/004), the revised Bangui Agreement administered by OAPI, copyright legislation (Law No. 2000/011), and emerging continental frameworks under the AfCFTA, examining how these instruments construct, regulate, and delimit technology transfer. The qualitative component draws on documented sectoral evidence from World Bank Enterprise Surveys, IMF digital payment assessments, UNESCO R&D expenditure data, and African Development Bank reports to identify patterns of informal technological learning across distinct sectors, digital financial services, construction and manufacturing, and the software development ecosystem, each exhibiting different risk profiles, scales of operation, and levels of technological complexity. This dual methodology enables the article to bridge the gap between formal legal doctrine and the empirical realities of technology diffusion in Cameroon. It shifts the analytical focus from ownership and contractual exchange to absorption, adaptation and capability formation. Rather than advocating heavy-handed regulation or continued neglect, the article advances a light-touch regulatory approach that conceives law as enabling infrastructure, one that supports learning, coordination, and diffusion without undermining the flexibility that makes informal transfer effective.[17]

The article proceeds in four parts. Part I develops a conceptual framework distinguishing formal and informal technology transfer mechanisms. Part II presents the effects of informal technology transfer on the Cameroonian economy. Part III analyzes the effects of informal technology on development in Cameroon, and Part IV proposes targeted legal and policy interventions and concludes by reflecting on the broader implications for technology governance in resource-constrained developing economies navigating the contemporary digital transformation.

Conceptual Framework Distinguishing Formal And Informal Technology Transfer Mechanisms.

Mechanisms such as licensing agreements, joint ventures, foreign direct investment accompanied by technology transfer clauses and university-industry collaborations are arrangements that generate contracts, institutional records, and measurable transactions that lend themselves more readily to legal analysis, policy design and empirical measurement. Previous scholars have placed greater emphasis on these formal, contract-based exchanges than on informal flows of knowledge and skills. This analytical preference, however, has come at a cost. By focusing on what is visible and documentable, much of the literature underestimates the significance of informal channels through which technological capabilities are actually built. Informal technology transfers, through learning-by-doing, labour mobility, imitation, apprenticeship and peer-to-peer knowledge exchange, often leave no contractual trace and generate no licensing revenue, yet it plays a decisive role in shaping productive capacity, particularly in developing economies. Daron (2024),[18] in addressing the African Development Bank, remarks that the most transformative forms of technological learning frequently emerge "through channels that leave no contracts, generate no licensing fees, and operate outside formal institutional frameworks." Against this backdrop, a strict dichotomy between formal and informal technology transfer is increasingly difficult to sustain. Digitalization and the rise of artificial intelligence have blurred traditional boundaries, enabling hybrid forms of knowledge diffusion that combine elements of both. Online platforms, open-source ecosystems, and AI-enabled learning tools now facilitate structured yet non-contractual exchanges of technical knowledge at scale, particularly in resource-constrained environments. These developments challenge conventional regulatory assumptions that equate technology transfer with formal ownership-based transactions. This section therefore, develops a conceptual framework that distinguishes formal from informal technology transfer mechanisms while recognizing their growing convergence in digitally mediated contexts.

[16] Maskus, K. E. (2004). *Encouraging international technology transfer*.

[17] Gilardi, F., & Radaelli, C. (2012). In *Oxford Handbook of Governance*.

[18] African Development Bank (AfDB). (2024). *Annual Meetings – Keynote address by Daron Acemoglu*. African Development Bank Group. https://www.afdb.org/.

Rather than treating the two as mutually exclusive, the framework examines their defining characteristics, theoretical foundations, and contemporary expressions, with particular attention to platform-mediated knowledge exchange, AI-facilitated learning, and hybrid transfer architectures emerging across developing economies. In doing so, it provides an analytical foundation for understanding how technology transfer now operates beyond the limits of traditional contractual and institutional models.

Formal Technology Transfer: Definition And Characteristics

Formal technology transfer refers to the movement of technological knowledge through explicit contractual arrangements and institutional frameworks that establish legally enforceable rights and obligations between technology providers and recipients.[19] Unlike informal diffusion, formal transfer is structured, documented and typically mediated by law, making it visible, measurable, and more amenable to regulatory oversight.[20] Core characteristics of formal transfer include :

Contractual Codification

One of the prominent characteristics of formal technology transfer is its reliance on legally binding contracts that specify the scope of the technology transferred, performance obligations, payment terms, intellectual property ownership, confidentiality requirements, and dispute resolution mechanisms.[21] These agreements provide predictability and legal certainty, particularly where high-value or strategically sensitive technologies are involved.

Common contractual forms include patent licensing agreements granting defined exploitation rights in exchange for royalties, technology licensing contracts that combine access to know-how with technical assistance, foreign direct investment arrangements incorporating technology transfer obligations, and joint ventures that formalize technology-sharing commitments between partners. University-industry collaboration agreements further exemplify this model by governing research partnerships and allocating intellectual property arising from joint innovation. At the continental level, African trade and innovation policy has increasingly emphasized formal licensing frameworks. The African Continental Free Trade Area (AfCFTA) process, for example, treats intellectual property licensing as a central instrument for facilitating cross-border technology exchange, reinforcing the contractual orientation of formal transfer within intra-African trade.[22]

Institutional Intermediation

Formal technology transfer is typically mediated by institutional actors with legal capacity to negotiate, implement and enforce agreements. These include multinational corporations, universities, public research institutes, technology transfer offices, and government agencies. Such institutions serve as intermediaries that reduce information asymmetries, manage intellectual property portfolios, and provide organizational infrastructure for commercialization. Despite their growing presence, institutional intermediaries account for only a limited share of overall technology diffusion in many developing regions. Recent evidence suggests that, while technology transfer offices in Africa have expanded in number, their contribution to aggregate technology flows remains modest compared to informal and market-based learning channels.[23]

Dependence on Intellectual Property Protection

Formal technology transfer is closely tied to intellectual property rights regimes, which define what is being transferred and protect the proprietary interests of technology suppliers. Patents, copyrights, trademarks and trade secrets function as the legal foundations upon which formal agreements are constructed. At the international level, the TRIPS Agreement establishes baseline standards that shape how technology licensing is

[19] Teece, D. J. (1977). Technology transfer by multinational firms. *The Economic Journal*, 87(346), 242–261.
[20] UNCTAD. (2001). *Transfer of technology*. United Nations. https://unctad.org/topic/transfer-of-technology.
[21] Arora, A., & Gambardella, A. (2010). Ideas for rent: An overview of markets for technology. *Industrial and Corporate Change*, 19(3), 775–803.
[22] African Union. (2024). *AfCFTA intellectual property negotiations*. https://au.int/afcfta.
[23] WIPO. (2019). *Technology transfer and IP*. https://www.wipo.int/technology-transfer.

structured worldwide. However, scholars and policymakers have long noted that strict intellectual property standards may constrain technology diffusion in developing economies by increasing costs and limiting adaptive use.[24] This tension is particularly salient in African contexts, where formal IP-driven transfer often coexists uneasily with broader development objectives.

Emphasis on Codified Knowledge

Formal mechanisms tend to prioritize the transfer of explicit, codified knowledge, such as blueprints, technical manuals, patented inventions, software code, and standardized procedures, that can be articulated and transmitted through documentation.[25] While this facilitates legal clarity and contractual enforcement, it often excludes tacit knowledge, which is critical for effective use, adaptation, and innovation. As a result, recipients may gain legal access to technology without acquiring the deeper experiential know-how required for mastery, particularly where training and learning-by-doing are limited.

Transaction Costs and Barriers to Entry

Formal technology transfer is associated with significant transaction costs, including legal fees, intellectual property registration expenses, due diligence, regulatory compliance, and contract enforcement.[26] These costs can be prohibitive for small and medium-sized enterprises (SMEs) and individual innovators in developing economies. Empirical evidence indicates that formal licensing costs in Sub-Saharan Africa represent a substantially higher proportion of total technology acquisition costs than in OECD countries.[27] Consequently, while formal transfer offers legal certainty and protection, it often remains inaccessible to many local actors, reinforcing reliance on informal and hybrid learning pathways.

Informal Technology Transfer: Definition And Characteristics

Informal technology transfer refers to the diffusion of technological knowledge and skills through channels that operate outside formal contractual arrangements and regulatory frameworks. Unlike formal transfer, it does not rely on legally binding agreements or explicit compensation mechanisms. Instead, knowledge flows through everyday social, professional, and economic interactions, as well as through digitally mediated environments that facilitate learning without generating enforceable legal obligations.[28] Informal transfer is therefore less visible to policymakers but often more central to capability formation in developing economies. Key characteristics of informal transfer include:

Non-Contractual Knowledge Flows

A key feature of informal technology transfer is its non-contractual nature**.** Knowledge circulates without formal agreements specifying ownership, obligations, or remuneration, making the process flexible but largely undocumented. Several channels are particularly prominent.

- Firstly, labour mobility plays a critical role. Engineers, technicians, and managers moving between firms carry with them tacit skills, routines, and problem-solving approaches that are difficult to codify. Empirical studies consistently show that inter-firm mobility is a powerful conduit for knowledge diffusion, particularly in technology-intensive sectors.

- Secondly, social and professional networks facilitate continuous learning. Industry associations, alumni networks, ethnic and diaspora ties, and online professional communities enable the informal exchange

[24] Schneider, J. (2024). International technology transfer to Africa in light of the SDGs. *Journal of International Development*, 36(3), 1245–1267.
[25] Lall, S. (1992). Technological capabilities and industrialization. *World Development*, 20(2), 165–186.
[26] Williamson, O. E. (1985). *The economic institutions of capitalism*. Free Press. https://books.google.com/.
[27] World Bank. (2024). *Enterprise Surveys: Innovation and technology licensing*. https://www.enterprisesurveys.org/.
[28] Bell, M., & Pavitt, K. (1993). Technological accumulation and industrial growth: Contrasts between developed and developing countries. *Industrial and Corporate Change*, 2(2), 157–210.

of technical advice, troubleshooting support, and experiential knowledge. Such networks reduce learning costs and substitute for formal training systems where institutional support is weak.

- Thirdly, reverse engineering and adaptive imitation allow firms to learn by examining existing products and processes and modifying them to suit local conditions. This mechanism has historically been central to technological catch-up, enabling firms to move gradually from imitation to innovation.

- Fourthly, participation in supply chains provides opportunities for learning through repeated interaction with lead firms. Suppliers absorb knowledge through exposure to quality standards, technical specifications, and performance feedback, often without any explicit technology transfer agreement.

- Finally, digital platform-mediated learning has emerged as a dominant contemporary channel. Online tutorials, open-source repositories, developer forums, and AI-assisted tools enable self-directed learning at scale. These platforms lower entry barriers and expand access to technical knowledge across geographic and institutional boundaries.

Emphasis on Tacit Knowledge

Informal technology transfer is particularly effective in transmitting tacit knowledge, the skills, intuitions, and context-specific know-how that cannot be fully captured in manuals or formal documentation. Learning occurs through observation, practice, mentorship, and repeated problem-solving rather than through written instructions alone. Apprenticeship systems in sectors such as construction, manufacturing, and digital services illustrate how practical competence is built through experience rather than formal training. Even in the era of artificial intelligence, peer interaction and mentorship remain essential complements to digital tools, particularly for mastering complex tasks.

Low Transaction Costs and Accessibility

Another defining characteristic of informal transfer is its low cost**.** Informal learning typically involves little or no monetary expenditure, making it accessible to small firms, entrepreneurs, and individuals with limited resources. By contrast, formal licensing and training arrangements often involve substantial legal and administrative costs that exclude many local actors. The affordability of informal mechanisms explains their widespread use in developing economies and their importance in broad-based skill acquisition.

Spontaneity and Organic Emergence

Informal knowledge flows emerge organically rather than through deliberate institutional design. They arise from routine interactions, shared problem-solving, and the social dynamics of work and community life.[29] Digital connectivity has accelerated this process by enabling spontaneous communities of practice to form across borders and sectors, often without centralized coordination or oversight.

Regulatory Invisibility

Because informal technology transfer operates outside formal legal frameworks, it is largely invisible to regulators and policymakers. Skills acquired through online learning platforms, peer mentorship, or workplace experience are rarely certified, recorded, or monitored. This invisibility has clear advantages, including flexibility and inclusiveness. At the same time, it poses challenges related to quality assurance, intellectual property disputes, and the alignment of informal learning with national development objectives.

Effects Of Regulatory Silence On Informal Technology Transfer In Cameroon

Regulatory silence refers to the absence of explicit legal rules, policy instruments, or institutional frameworks governing a particular activity. While Cameroon's legal framework addresses formal technology transfer through investment law, intellectual property legislation, and regional instruments under OAPI, it remains

[29] World Bank. (2025). *Digital connectivity and skills development in emerging economies*. World Bank Group. https://www.worldbank.org.

largely silent on informal modes of technological learning such as labour mobility, apprenticeships, digital self-learning, reverse engineering, and peer-to-peer knowledge exchange. This silence has produced a range of interconnected effects, both enabling and constraining, on technological capability development. They include:

Flexibility and Grassroots Innovation

One immediate effect of regulatory silence is the preservation of flexibility within informal technology ecosystems. In the absence of licensing requirements, certification barriers, or compliance obligations, individuals and small enterprises are free to experiment, learn, and adapt technologies using locally available resources. This has been particularly important in Cameroon, where formal technology acquisition remains costly and access to institutional training is uneven. Informal learning through apprenticeships, labour mobility, and digital platforms has enabled a broad segment of the population, especially youth and micro-entrepreneurs, to acquire practical technological skills in areas such as mobile application development, electronics repair, construction techniques, and digital services.[30] Regulatory silence thus functions as an enabling environment, allowing informal mechanisms to compensate for institutional capacity gaps and limited public investment in technical education. However, the nature and implications of this flexibility vary significantly across sectors, depending on differences in risk, scale, and technological complexity. In digital financial services, for instance, informal agent networks facilitate mobile money adoption at scale, but the associated risks, consumer fraud, data privacy breaches, and systemic financial instability, are qualitatively different from those in construction or artisanal manufacturing, where informal learning primarily affects product quality and worker safety. In the software development ecosystem, informal learning through open-source platforms and online communities carries relatively lower regulatory risk but raises distinct challenges around intellectual property attribution and cybersecurity. A nuanced regulatory response must therefore account for these sectoral variations rather than treating informality as a uniform phenomenon.

Rapid Knowledge Diffusion and Inclusiveness

The absence of formal regulatory constraints has also facilitated rapid diffusion of knowledge across social and professional networks. Informal technology transfer in Cameroon occurs through dense interpersonal ties, family networks, trade associations, diaspora connections, and online communities, allowing knowledge to circulate quickly and at low cost. This inclusiveness has reduced entry barriers for actors who would otherwise be excluded from formal technology transfer systems, such as informal sector workers, small-scale manufacturers, and self-taught digital professionals. Digital platforms and open-source tools, in particular, have expanded access to global knowledge repositories without requiring state mediation or institutional affiliation.[31] In this sense, regulatory silence has contributed to democratizing access to technological learning.

Absence of Quality Assurance and Skill Validation

At the same time, regulatory silence creates significant quality and credibility challenges. Skills acquired through informal mechanisms are rarely certified, standardized, or formally recognized. As a result, employers, investors, and public institutions often struggle to assess the reliability and competence of informally trained technicians and innovators. In Cameroon, this lack of skill validation limits labour mobility across sectors and borders and constrains the scalability of innovations developed through informal pathways. Without certification frameworks or recognition mechanisms, informally acquired competencies remain largely confined to local markets, reducing their developmental impact.

Weak Intellectual Property Protection and Legal Uncertainty

Regulatory silence also generates legal ambiguity around intellectual property rights in informal technology transfer. When knowledge is acquired through observation, imitation, or digital self-learning, questions arise concerning ownership, permissible use, and liability. In the absence of clear legal guidance, informal innovators may inadvertently infringe existing intellectual property rights or face challenges protecting their

[30] Kamdem, E. (2016). Entrepreneurship and business creation in Cameroon. *African Journal of Economic and Management Studies*, 7(4), 482–501.

[31] https://www.worldbank.org/ext/en/home.

own incremental innovations. This uncertainty discourages some actors from commercializing innovations or engaging with formal markets, thereby limiting the transition from informal learning to structured innovation ecosystems. It also exposes informal learners to legal risks that they may not fully understand or anticipate. A closer examination of the applicable legal instruments reveals the depth of this gap. The revised Bangui Agreement (2015), which constitutes the primary intellectual property framework for OAPI member states including Cameroon, is structured around the registration and protection of patents, utility models, trademarks, and industrial designs, categories that presuppose formal, codified innovation. Annex I of the Agreement, governing patents, requires novelty, inventive step, and industrial applicability as conditions for protection, criteria that incremental adaptations and tacit innovations developed through informal learning processes rarely satisfy. Similarly, Cameroon's Copyright Law (Law No. 2000/011 of 19 December 2000) protects original works of authorship but provides no framework for recognizing or protecting the collective, iterative, and often unattributed innovations characteristic of informal technology ecosystems. The Investment Code (Law No. 2013/004 of 18 April 2013) offers fiscal incentives and guarantees to approved investors but does not impose substantive technology transfer obligations, mandatory skills training, or local content requirements that would link foreign investment to informal capability-building. Furthermore, OAPI's institutional practice has focused predominantly on registration and enforcement rather than on facilitating technology diffusion or supporting adaptive innovation. The absence of utility model protection tailored to incremental innovations, the lack of provisions for traditional knowledge and community-based technological practices, and the limited engagement with informal sector realities in OAPI's technical assistance programs collectively illustrate how the existing legal architecture operates in isolation from the predominant modes of technological learning in Cameroon.

Limited Policy Learning and Strategic Coordination

Because informal technology transfer operates outside regulatory and reporting frameworks, it remains largely invisible to policymakers**.** Government agencies lack reliable data on the scale, sectoral distribution, and outcomes of informal learning processes. This invisibility hinders evidence-based policymaking and prevents the state from identifying which informal mechanisms are most effective for technological upgrading. As a result, Cameroon misses opportunities to strategically support successful informal pathways through targeted incentives, infrastructure investment, or complementary training programs. Regulatory silence thus reinforces a disconnect between actual learning processes and national development planning.

Reinforcement of Structural Dualism

Regulatory silence contributes to a form of structural dualism in Cameroon's technology landscape. Formal sectors, often foreign-dominated and capital-intensive, operate under explicit legal frameworks, while informal sectors where most learning occurs, remain legally marginal. This separation limits knowledge spillovers between sectors and constrains the movement of informal innovators into higher-value segments of the economy. Over time, this dualism undermines coherent industrial development and perpetuates dependence on imported technologies, despite the presence of substantial local learning capacity.

Summarily, regulatory silence on informal technology transfer in Cameroon produces a paradoxical outcome. It enables flexibility, inclusiveness, and rapid learning, yet simultaneously generates uncertainty, limits scalability, and weakens strategic coordination. Informal mechanisms thrive precisely because they operate beyond the law, but this very invisibility constrains their developmental potential. Understanding these effects is essential for designing regulatory approaches that support, rather than suppress, informal technology transfer while addressing its structural limitations.

Developmental Consequences Of Regulatory Silence On Informal Technology Transfer

The regulatory silence surrounding informal technology transfer mechanisms in Cameroon is not a neutral absence of law; it is a policy choice with profound developmental ramifications. This regulatory silence might be defended as preserving flexibility and avoiding bureaucratic constraints on organic learning processes, but evidence from Cameroon's developmental trajectory suggests that the absence of regulatory guidance generates high costs that outweigh any benefits from regulatory non-interference. The consequences of this silence are neither abstract nor theoretical; they manifest concretely in quality problems, market failures, legal

uncertainties, coordination gaps, exclusions from opportunity, and informational deficits that collectively undermine Cameroon's capacity to convert widespread informal technological activity into systematic capability-building and sustained development. Understanding these consequences is essential for recognizing that regulatory reform must extend beyond strengthening formal IP protection to actively addressing the governance needs of informal technology diffusion, where most actual learning occurs.

Uncertain quality and consumer risks

When technology is acquired informally, there are no clear standards to guarantee quality or protect users. Small businesses, farmers, and trainees often invest in tools, software, or training without knowing whether they are reliable or legitimate. This exposes them to poor-quality technologies, fraud, and financial loss, especially where after-sales support or warranties are absent**.**

Unrecognized skills and weak labour markets

Many Cameroonians gain valuable technical skills through apprenticeships and self-learning, but these skills are rarely certified. As a result, workers cannot prove their competence and employers cannot easily assess it. This leads to underemployment, low wages, and inefficient hiring, even where strong practical skills exist.

Legal uncertainty that discourages innovation

Because informal learning and adaptation operate in legal grey areas, firms are often unsure whether activities like reverse engineering are lawful. This uncertainty discourages small businesses from improving or adapting technologies, as they fear intellectual property disputes. In practice, regulatory silence chills the very local innovation Cameroon needs.

Poor coordination and repeated learning efforts

Without institutions to link informal learners, firms often solve the same technical problems separately. Knowledge is not shared, learning is duplicated, and collective upgrading becomes difficult. This slows sector wide improvement, especially among small enterprises facing similar technological challenges.

Exclusion from finance and formal opportunities

Enterprises using informally acquired technologies often lack the documentation that banks and large buyers require. As a result, capable businesses are denied loans, public contracts, and participation in formal value chains. This keeps firms informal even when they have the capacity to grow and formalize.

Lost revenue and weak development planning

Regulatory silence leaves governments blind to much technological activity. Informal technology services and training escape taxation, while policymakers lack data on how skills are built and technologies used. This makes development planning ineffective and reinforces policies based on only a small, formal part of the economy.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Cameroon's technology transfer regulatory framework suffers from a profound disconnection between formal legal instruments focused on intellectual property protection and the actual informal processes through which technological capabilities develop. This mismatch generates concrete developmental costs: technological dependence, failed structural transformation, inadequate employment, skills gaps and vulnerability to external shocks that undermine Vision 2035 and perpetuate poverty. Addressing this requires regulatory innovation that acknowledges informal learning mechanisms, promotes absorptive capacity alongside technology acquisition, strategically channels technology transfer toward capability-building, coordinates fragmented frameworks toward developmental objectives, and prepares for digital disruption. Comparative experience from other

African and Global South economies reinforces the viability of this approach. Kenya's National Industrial Training Authority has demonstrated how competency-based certification can formalize recognition of informally acquired skills without stifling learning flexibility. Rwanda's ICT sector development illustrates how light-touch regulatory sandboxes can encourage digital innovation while maintaining baseline consumer protection. India's experience with the National Skill Development Corporation offers a model for public-private partnerships that bridge informal skill acquisition and formal labour market integration. Brazil's SEBRAE programme has shown how targeted technical assistance to micro and small enterprises can enhance the quality and scalability of informally developed technologies without imposing heavy regulatory burdens. These examples suggest that Cameroon is not without precedent in seeking regulatory frameworks that harness rather than suppress informal technological dynamism. The path from dependence to indigenous innovation is neither short nor simple, but reform begins with acknowledging that current frameworks inadequately serve Cameroon's transformation needs. The way forward is for Cameroon to summon the political will and strategic vision to undertake necessary reforms.

RECOMMENDATIONS

In light of the developmental consequences identified above, it becomes evident that Cameroon's technology transfer framework requires a deliberate shift from a narrow focus on intellectual property protection toward a more development-oriented regulatory approach. Addressing the regulatory mismatch between formal legal frameworks and the realities of technology diffusion demands targeted legal and policy interventions that strengthen substantive technology transfer while preserving flexibility for informal learning mechanisms. The following recommendations propose practical reforms aimed at embedding capability-building, skills development, and domestic innovation objectives into Cameroon's technology transfer regime.

Develop Comprehensive Technology Transfer Legislation

Enact specific legislation beyond intellectual property protection to regulate technology licensing agreements, prohibit anti-competitive clauses, establish contract monitoring systems, and provide dispute resolution mechanisms that balance IP rights with local capability-building.

Integrate Technology Transfer Requirements into Investment and Procurement

Mandate technology transfer, skills training, local R&D activities, and supplier linkages in foreign investment contracts and government procurement to ensure that capital inflows build indigenous capabilities rather than create dependence.

Establish Institutional Coordination Mechanisms

Create an inter-ministerial body to harmonize technology transfer policies across investment, IP, competition, education, and industrial development, ensuring coherent national strategies and alignment between formal regulations and informal practices. This coordination body should operationalize facilitation without imposing rigid formalization through concrete soft law instruments, including voluntary codes of practice for technology intermediaries, sector-specific quality guidelines developed in consultation with informal sector actors, and competency-based certification frameworks that recognize informally acquired skills without requiring full formal accreditation. Public-private coordination platforms, modelled on successful examples such as Kenya's National Industrial Training Authority partnerships with informal sector associations, could bridge the gap between state regulatory capacity and informal learning ecosystems. Additionally, light-touch registration mechanisms, voluntary rather than mandatory, could enable informal technology service providers to access public procurement opportunities, financial services, and institutional support without surrendering the flexibility that sustains their operations.

Build Absorptive Capacity Through Education and Research Investment

Increase investment in technical education and R&D, reform curricula to match industrial needs, establish competency-based certification for informal skills, and create tax incentives for firms training local workers.

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Prepare for Digital and Frontier Technologies

Establish adaptive regulatory frameworks for digital platforms, artificial intelligence, biotechnology, and climate-related technologies to enable Cameroon to harness emerging innovations for leapfrog development.