Chapter 2: Dynamics, Trends and Context of Carbon Trading: Stakeholders and the Markets: Asia, Latin America and Africa

Carbon trading is a market-based mechanism aimed at reducing greenhouse gas emissions by putting a price on them through instruments like cap-and-trade systems and carbon taxes (Kukah *et al*., 2025). It works by allocating emission allowances efficiently, letting entities reduce emissions or buy credits from others, promoting cost-effective reduction strategies (Stavins, 2022). Evidence shows emissions trading systems (ETS) have cut CO_2 emissions by up to 18.1% in some areas, encouraging renewable energy use (Bai & Ru, 2022). The European Union Emissions Trading System (EU ETS) is the most developed carbon market, with other regions such as North America and Australia adopting different models based on their political and regulatory contexts (Dabhi, 2019). These systems influence domestic climate policies and serve as examples for newer markets (Stavins, 2022; Dabhi, 2019).

Emerging markets in Asia, Latin America, and Africa are highlighted for their ecological vulnerability and development needs, facing challenges like weak institutions and regulatory fragmentation but also opportunities in nature-based solutions (Kukah *et al.,* 2025; Kumar & Singh, 2025). Asia's markets, notably China's national ETS and South Korea's KETS, mix state innovation and cooperation, while Latin America focuses on forest offsets and REDD+ programs (Marcato, 2023). Africa is still developing infrastructure but shows potential through voluntary markets and community-led forest projects (Okeke *et al*., 2024).

Carbon trading mechanisms encompass legal, institutional, and economic tools that enable trading of GHG emission allowances or credits, aiming to internalize emissions costs through market incentives

(Sun, 2024; Kumar & Singh, 2025). Their development is shaped by global climate governance and national policies, especially in Asia, Latin America, and Africa (UNCTAD, 2024). The Kyoto Protocol introduced three key market mechanisms: Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET) (UNFCCC, n.d.). CDM allowed developed countries to invest in projects in developing countries to earn emission reductions, JI enabled project trading among developed countries, and IET allowed exchange of emission units among Annex I countries (Sahu, 2024). CDM projects expanded in Latin America and Asia, especially in renewables, forestry, and waste management (Pacagnella Junior *et al*., 2025). The Paris Agreement introduced Article 6, with cooperative approaches like Article 6.2 for transferring mitigation outcomes aligned with NDCs and Article 6.4 establishing a Sustainable Development Mechanism (SDM) for better transparency and ambition, which is crucial for emerging economies (Hoffmann *et al.,* 2025; Diagne, 2023).

Compliance markets such as the EU ETS, China's ETS, and Korea's ETS operate under legal caps with strict monitoring and verification (MRV) (Zhang *et al.,* 2024). Entities receive emission allowances and can trade surplus or buy more to meet targets. Voluntary carbon markets (VCMs) allow non-state actors to buy verified emission reduction credits from projects like afforestation or renewable energy, governed by standards like Verra, Gold Standard, and ART-TREES, but concerns over additionality and permanence persist (Wetterberg *et al.,* 2024; UNCTAD, 2024).

Credit credibility depends on methodological rigor, including baseline setting, additionality, leakage, and permanence (Barata, 2016). Verra's VM0015 for Improved Forest Management is widely used but criticized for leakage and permanence risks (NCX, 2021). Gold Standard emphasises community benefits and sustainable development alignment, while ART-TREES focuses on jurisdictional REDD+ accounting. These methodologies affect credit quality, trust, and prices

(Hyolmo, 2025). Registries are key for tracking credit issuance, ownership, retirement, and transfer, with platforms like Markit, APX, and UNFCCC Article 6 registry advancing transparency and interoperability (Michaelowa *et al.*, 2023). In Africa, Regional Collaboration Centres (RCCs) in Kampala and Lomé support registry readiness with technical aid and capacity building (UNFCCC, 2022). However, gaps remain in digital infrastructure, MRV, and coordination, limiting integration with global markets.

Beyond infrastructure, the strategic linking of carbon markets across jurisdictions offers significant potential to enhance liquidity, reduce abatement costs, and harmonise price signals. Market linkages—such as the integration of the EU ETS with the Swiss ETS—require alignment of MRV protocols, legal frameworks, and governance structures (Wang, 2020). In Latin America, hybrid systems in Chile and Colombia combine carbon taxes with offset mechanisms, allowing regulated entities to use high-integrity credits for partial compliance (UNCTAD, 2024). Emerging interest in transcontinental linkages, such as between African nature-based credits and Asian corporate offset demand, may reshape regional market dynamics and financing flows.

In parallel, sectoral mechanisms are gaining traction under Article 6.4, with methodologies under development for high-emitting sectors such as cement, transport, and agriculture (Michaelowa *et al.*, 2023). Nature-based solutions (NBS), particularly forest-based credits including REDD+, IFM, and afforestation, continue to dominate voluntary markets. While these approaches offer substantial mitigation potential, they are subject to scrutiny regarding verification protocols, permanence risks, and equitable benefit-sharing (Pietracci *et al.*, 2023). In the Zimbabwean context, opportunities exist to scale IFM and agroforestry credits under high-integrity standards, supported by regional initiatives such as the African Carbon Market Initiative.

As carbon markets mature, they are increasingly integrated into mainstream financial systems through instruments such as futures, options, and structured products. Exchanges like ICE and CME offer carbon futures, enabling hedging and speculative trading (Serafini & Bormetti, 2024). While financialisation may enhance liquidity and price discovery, it also introduces risks related to market manipulation, volatility, and potential disconnects from underlying environmental outcomes (Sun, 2024). Effective regulatory oversight and transparency are therefore essential to ensure that financial instruments reinforce, rather than undermine, climate objectives.

Equity considerations remain central to the legitimacy and effectiveness of carbon trading mechanisms, particularly in least developed countries. Community-based projects often face barriers including lack of upfront finance, limited technical support, and restricted access to verification infrastructure (Quak, 2025). Proposals for results-based finance, sovereign credit guarantees, and carbon trust funds aim to democratize access and ensure equitable benefit-sharing. The African Carbon Market Initiative exemplifies efforts to promote inclusive participation by supporting project developers, enhancing credit quality, and facilitating market entry (World Bank, 2025).

Despite their transformative potential, carbon trading mechanisms continue to face persistent challenges. Price volatility, regulatory fragmentation, and limited MRV infrastructure constrain market participation and credibility. The proliferation of low-quality credits and greenwashing in voluntary markets further undermines trust. Addressing these challenges requires coordinated international governance, robust methodological standards, and inclusive stakeholder engagement—particularly in regions with emerging market structures and high mitigation potential (UNCTAD, 2024). Carbon trading systems are shaped by a constellation of actors whose interests, capacities, and institutional leverage vary across regions. We analyse the roles and incentives of key stakeholders such as governments, private sector

entities, civil society organisations, Indigenous communities, and international institutions while mapping their engagement across major carbon market platforms in Asia, Latin America, and Africa**.**

Governments serve as foundational actors in carbon trading systems, functioning as regulators, facilitators, and market architects across compliance and voluntary frameworks (World Bank, 2023). In Asia, China's Ministry of Ecology and Environment oversees the national Emissions Trading Scheme (ETS) that covers over 2,000 entities and is designed to align industrial decarbonisation with national climate targets (ICAP, 2022). The Chinese government's centralised control reflects a strategic interest in integrating carbon pricing with broader energy and economic reforms (Zhang, 2022). In Latin America, governments such as Brazil's have adopted hybrid approaches, combining REDD+ mechanisms with emerging domestic carbon pricing instruments (ICC Brasil & Way Carbon, 2023). Brazil's Ministry of Environment plays a dual role, regulating forest-based offset projects while facilitating stakeholder engagement in voluntary markets (Vargas *et al.,* 2021). In Africa, governmental involvement is largely shaped by donor partnerships and international frameworks, with countries like Ghana and Rwanda participating in Article 6 pilot programmes and regional carbon finance initiatives (UNDP, 2024). However, institutional fragmentation and limited technical capacity continue to constrain regulatory effectiveness in many African jurisdictions.

Private sector entities are instrumental in scaling carbon markets, acting as credit generators, buyers, and financial intermediaries (EEP Africa & Open Capital, 2023). In Asia, corporations such as PetroChina have embedded carbon trading into their ESG strategies, aligning emissions reduction with investor expectations and national policy mandates (PetroChina, 2022). Alibaba Group has adopted a digital-first carbon neutrality roadmap, leveraging Scope 3+ accounting and platform-wide emissions tracking to influence voluntary market dynamics (Alibaba Group, 2021).

In Latin America, project developers like Biofílica and South Pole facilitate forest-based offset generation, managing verification, certification, and credit issuance under REDD+ and nature-based solutions (South Pole, 2023). These actors play a critical role in maintaining market integrity and investor confidence, particularly in voluntary markets where third-party validation is essential. Financial institutions also shape market liquidity through carbon funds and green bonds, with frameworks such as the Partnership for Carbon Accounting Financials (PCAF) guiding emissions disclosure and portfolio alignment (PCAF, 2024). Despite these contributions, concerns persist regarding offset quality and corporate greenwashing. Recent evaluations indicate that a significant proportion of rainforest offsets lack verifiable climate benefits, raising questions about the credibility of private sector climate claims (Carbon Market Watch, 2023).

Civil society organisations and Indigenous communities occupy critical yet often marginalized roles in carbon trading systems, particularly in forest-based offset projects (Durmaz& Schroeder, 2025). Their involvement spans project implementation, monitoring, advocacy, and resistance, especially where land tenure and benefit-sharing mechanisms are contested. In Latin America, Indigenous federations in Ecuador and Brazil have challenged REDD+ initiatives that exclude traditional governance structures and fail to deliver promised co-benefits (Reed, 2011).

In Africa, community-based organisations in Kenya, Ghana, and Zimbabwe engage in afforestation and reforestation projects, often supported by international NGOs and bilateral donors (Gondo, 2012). However, limited legal recognition, technical capacity, and access to market information continue to undermine their agency and participation (Tanveer *et al*, 2024). Civil society actors also serve as watchdogs, scrutinizing offset quality, corporate claims, and regulatory loopholes. Their advocacy has prompted reforms in certification standards and increased transparency, though enforcement remains

uneven (Carbon Market Watch, 2023). The inclusion of civil society and Indigenous communities is not merely normative but essential for ensuring the legitimacy, sustainability, and justice of carbon trading systems.

International organisations function as norm-setters, financiers, and technical advisors within carbon trading systems, shaping both compliance and voluntary market architectures across regions (IOSCO, 2023). Institutions such as the United Nations Framework Convention on Climate Change (UNFCCC), the World Bank, and the Green Climate Fund (GCF) influence project design, monitoring, reporting, and verification (MRV) standards, and financial flows through mechanisms like REDD+, Article 6, and results-based payments (Christen *et al*., 2023).

Their strategic interests include promoting global mitigation, enhancing transparency, and fostering South–South cooperation. For example, the World Bank's Carbon Pricing Dashboard and Partnership for Market Implementation (PMI) provide technical support and capacity-building for emerging markets, including those in Africa and Latin America (World Bank, 2023). These initiatives aim to harmonise carbon pricing instruments and facilitate cross-border credit transfers. However, critiques persist regarding top-down governance and donor conditionalities. In several African and Latin American contexts, international institutions have been accused of imposing rigid frameworks that inadequately reflect local socio-political realities and ecological priorities (Gadde, 2022). Moreover, the dominance of Northern actors in global carbon governance raises concerns about equity, representation, and the distribution of climate finance (Pettinotti *et al*., 2022). Despite these tensions, international organisations remain indispensable to the scaling and standardisation of carbon markets, particularly in regions where domestic institutional capacity is limited. Their continued relevance depends on their ability to adapt frameworks to local contexts, support inclusive governance, and ensure environmental integrity.

Carbon trading platforms vary significantly across regions, reflecting differences in institutional design, stakeholder capacity, and political economy (Kreibich & Obergassel, 2022). In Asia, China's national Emissions Trading Scheme (ETS) has rapidly scaled to become the largest carbon market globally, covering over 4 billion tonnes of CO_2 annually and integrating digital MRV systems to enhance transparency and compliance (Ewing, 2024). The platform is state-dominated, with limited civil society participation, though corporate actors are increasingly involved in offset procurement and emissions reporting (Zhang, 2022).

In Latin America, carbon trading is primarily facilitated through voluntary platforms and REDD+ mechanisms, with Brazil, Colombia, and Peru leading in forest-based credit issuance (Tomaselli, 2022). The Brazilian Carbon Market, while still under development, is expected to integrate both compliance and voluntary elements, with stakeholder consultations emphasising Indigenous inclusion and biodiversity safeguards (Vargas *et al.,* 2021). However, fragmented governance and inconsistent verification standards remain challenges to market credibility and investor confidence (Wills, 2025).

Africa's engagement with carbon trading platforms is emergent and largely donor-driven, with countries such as Ghana, Rwanda, and Kenya participating in Article 6 pilot programmes and voluntary offset schemes (UNDP, 2024). The African Carbon Markets Initiative (ACMI), launched in 2022, aims to mobilize up to $6 billion in carbon finance by 2030, emphasising capacity building, MRV harmonisation, and equitable benefit-sharing (ACMI, 2023). Despite these ambitions, institutional capacity constraints and limited private sector involvement continue to hinder market scalability.

Comparatively, platforms such as the EU ETS and California Cap-and-Trade exhibit high regulatory maturity, robust MRV systems, and active private sector engagement, though they remain largely inaccessible to

Global South actors (Zetterberg, 2012). These disparities emphasise the need for interoperable frameworks and inclusive governance models that reflect regional priorities and stakeholder diversity (World Bank, 2023). Ultimately, the effectiveness and legitimacy of carbon trading platforms depend on their ability to balance environmental integrity, economic efficiency, and social equity across diverse geopolitical contexts.

Carbon trading systems in Europe, North America, and Australia are among the most institutionally mature and technically refined globally, having evolved through decades of experimentation and reform (Wettestad & Gulbrandsen, 2017). In Europe, the European Union Emissions Trading System (EU ETS), operational since 2005, remains the largest and most comprehensive cap-and-trade program, covering over 11,000 installations across energy, industry, and aviation sectors (ICAP,2022). The system has undergone successive reforms, including the Market Stability Reserve (MSR) and the transition from free allocation to auctioning that have enhanced price stability and environmental integrity (Perino *et al.,* 2022). Moreover, the EU ETS is expanding to include maritime transport and a separate ETS for buildings and road transport by 2027, reflecting its evolving sectoral breadth (European Commission, 2023).

In North America, carbon trading is primarily driven by subnational initiatives, notably the California Cap-and-Trade Program and the Regional Greenhouse Gas Initiative (RGGI) (CCES,2022). California's system, linked with Québec under the Western Climate Initiative, incorporates stringent compliance obligations, quarterly auctions, and offset protocols that include forestry and methane capture (Kotzampasakis & Woerdman, 2020). RGGI, covering eleven northeastern U.S. states, channels auction revenues into renewable energy and energy efficiency programmes, demonstrating how decentralised governance can yield robust climate outcomes (OceanBlocks, 2025).

Australia's carbon market has undergone significant restructuring since the repeal of its initial carbon pricing mechanism in 2014 (OGorman & Jotzo, 2014). The reformed Safeguard Mechanism, alongside the Australian Carbon Credit Units (ACCUs) framework, now facilitates emissions reductions through both compliance and voluntary pathways (Carbon Market Institute, 2024). The market emphasises nature-based solutions, Indigenous participation, and biodiversity co-benefits, with credits issued under methodologies approved by the Clean Energy Regulator (Rusell-Smith *et al.*, 2024).

Pricing trends vary across these jurisdictions. EU ETS prices have exceeded €90 per tonne of CO_2 in recent years, driven by tighter caps and speculative trading. California's prices range between $30 and $35 per tonne, supported by price containment mechanisms and allowance banking (Statistica, 2025). In Australia, ACCU prices have shown volatility, influenced by supply constraints, policy uncertainty, and evolving integrity standards (Carbon Market Institute, 2024). Verification and monitoring systems in these regions are among the most robust globally. The EU ETS mandates third-party verification, registry transparency, and digital MRV integration (European Commission, 2023). California's Air Resources Board enforces rigorous reporting protocols, while Australia's Clean Energy Regulator oversees credit issuance and project audits under the Emissions Reduction Fund (Carbon Market Institute, 2024).

Despite their maturity, these systems face persistent challenges. The EU ETS grapples with carbon leakage risks and the political complexities of linking with external markets post-Brexit (Zetterberg, 2012). North American systems contend with offset credibility concerns and political fragmentation, particularly in the absence of federal coordination (Kotzampasakis & Woerdman, 2020). Australia's market struggles with liquidity constraints, offset integrity, and the need for greater Indigenous inclusion in project governance (Carbon Market Institute, 2024). Comparatively, these platforms remain largely inaccessible to

Global South actors due to legal asymmetries, financial barriers, and infrastructural limitations. This exclusion underscores the need for interoperable frameworks and inclusive governance models that reflect regional priorities and stakeholder diversity (OceanBlocks, 2025).

The architecture of carbon trading in Asia is marked by a heterogeneous mix of compliance-based emissions trading schemes (ETSs) and voluntary carbon markets, reflecting divergent policy priorities, institutional capacities, and stages of market maturity across the region (Gupta *et al.,* 2024). While China and South Korea have operational national ETSs with legally binding caps and robust monitoring, reporting, and verification (MRV) systems, countries such as India, Indonesia, and Vietnam are in transitional phases, piloting frameworks or expanding voluntary mechanisms (MacDonald & Parry, 2024).

China's national ETS, launched in 2021, currently covers over 2,000 entities in the power sector, representing approximately 4 billion tonnes of CO_2 annually, making it the largest carbon market by volume globally (Gupta *et al.,* 2024). However, its effectiveness is constrained by limited price signals, free allocation of allowances, and data transparency challenges that have prompted calls for reform in auctioning mechanisms and sectoral expansion (Asia Society Policy Institute, 2025). In contrast, South Korea's K-ETS, operational since 2015, has progressively expanded its coverage to include 70% of national emissions, integrating auctioning and benchmarking methodologies that align more closely with EU ETS standards (Asia Society Policy Institute, 2022). Korea's ETS design is underpinned by a robust legal framework and phased implementation strategy, with dynamic cap-setting and sectoral differentiation that have contributed to improved liquidity and price stability (Asia Society Policy Institute, 2022).

India's carbon pricing trajectory has evolved from the Perform, Achieve, Trade (PAT) scheme toward a formalized carbon market framework, with the Bureau of Energy Efficiency and Ministry of Power initiating

consultations for a national ETS in 2023 (Asia Society Policy Institute, 2025). Indonesia, meanwhile, launched IDXCarbon in 2023 to facilitate the trading of Sertifikat Pengurangan Emisi Gas Rumah Kaca (SPE-GRK), signaling a shift toward regulated credit markets with Article 6 alignment (Carbon Market Institute, 2024).

Voluntary markets remain dominant in Southeast Asia, where smallholder agriculture and forestry-based offsets, particularly REDD+ and rice carbon farming are gaining traction under jurisdictional and landscape-level approaches (ASEAN Climate Resilience Network, 2023). The implementation of Article 6 of the Paris Agreement has further legitimized REDD+ activities under both cooperative approaches (Article 6.2) and centralised mechanisms (Article 6.4), provided they meet host country approval and MRV standards (Streck, 2021). However, scalability and methodological approval remain challenges, particularly for nature-based solutions that lack legacy CDM methodologies (Streck, 2021).

Despite the proliferation of carbon pricing instruments, price levels across Asian ETSs remain below the USD 50–100/tCO_2e benchmark recommended by the High-Level Commission on Carbon Prices to meet Paris Agreement goals, with China's ETS averaging below USD 10/tCO_2e in 2023 (World Bank, n.d). This price disparity underscores the need for enhanced market design, regional linkages, and institutional capacity-building to ensure environmental integrity and economic efficiency (Gupta *et al*., 2024).

The evolution of carbon trading in Latin America reflects a complex interplay between voluntary market leadership, emerging compliance instruments, and region-specific policy experimentation (Sullivan et al., 2021). While the region lacks a unified carbon pricing framework, several countries have initiated domestic instruments that align with broader climate mitigation goals under the Paris Agreement (UNFCCC, 2024).

Mexico's pilot emissions trading system (ETS), launched in 2020, represents the most advanced compliance mechanism in the region, designed to cap emissions from large industrial sectors and gradually transition into a mandatory phase (Sullivan *et al.*, 2021). Colombia, by contrast, has adopted a hybrid approach, integrating a carbon tax with offset mechanisms that allow regulated entities to purchase credits from verified mitigation projects (UNFCCC, 2024). Voluntary carbon markets dominate the regional landscape, particularly in Brazil, Peru, and Chile, where nature-based solutions such as REDD+ and afforestation projects have attracted significant international investment (Bataille *et al.,* 2020). These markets are often driven by corporate net-zero commitments and facilitated by third-party certification standards, such as Verra and Gold Standard that ensure environmental integrity and market credibility (Oliveira, Gurgel & Tonry, 2019).

Despite the proliferation of voluntary initiatives, Latin America faces persistent challenges in scaling compliance markets, including institutional fragmentation, limited technical capacity, and uneven regulatory maturity across jurisdictions (Sullivan *et al.,* 2021). The lack of harmonised carbon pricing instruments impedes regional integration and complicates cross-border credit trading, although recent dialogues under the REDiCAP initiative suggest growing interest in coordinated policy frameworks (UNFCCC, 2024).

Opportunities for regional carbon market development are substantial, particularly given Latin America's comparative advantage in land-based mitigation potential and renewable energy deployment (Bataille *et al.,* 2020). Countries such as Brazil and Mexico are well-positioned to serve as carbon credit exporters, leveraging their biodiversity and energy transitions to supply high-quality offsets to global buyers (Oliveira, Gurgel & Tonry, 2019).Moreover, the prospect of a linked regional ETS has gained traction among policymakers and scholars, with modelling studies indicating that such integration could reduce abatement costs, enhance market liquidity, and facilitate revenue recycling for low-carbon

development (Oliveira, Gurgel & Tonry, 2019). However, successful implementation would require robust governance structures, transparent MRV systems, and alignment with national development priorities (UNFCCC, 2024).

In sum, Latin America's carbon trading landscape is characterized by dynamic experimentation, voluntary market leadership, and emerging compliance instruments, all unfolding within a broader context of climate ambition and economic diversification (Sullivan *et al.*, 2021; Bataille *et al.*, 2020). The region's trajectory will depend on its ability to harmonise policy instruments, attract sustainable finance, and institutionalise carbon pricing within long-term climate strategies.

Carbon trading in Africa is evolving within a complex landscape shaped by voluntary market dominance, emerging regulatory frameworks, and structural constraints that reflect the continent's developmental and ecological realities. The market is largely driven by voluntary mechanisms, where corporations and international actors engage in offsetting emissions through afforestation, renewable energy, and REDD+ initiatives, often motivated by sustainability branding and climate finance imperatives (Cheffo, 2019). Although the Clean Development Mechanism (CDM) under the Kyoto Protocol provided early entry points, Africa's participation remained marginal due to high transaction costs and limited institutional capacity (Zhakata, 2024). The introduction of Article 6 of the Paris Agreement has renewed interest in compliance markets, offering pathways for bilateral trading and international crediting, contingent on robust monitoring and verification systems (Queku & Seidu, 2025).

Recent developments such as the Africa Carbon Markets Initiative (ACMI) reflect a strategic shift toward scaling carbon markets with integrity and equity. ACMI's roadmap envisions retiring 300 million credits annually by 2030 and unlocking up to USD 120 billion by 2050, involving over 400 stakeholders across ministries, financial institutions,

and civil society (ACMI, 2024; AUDA-NEPAD, 2024). However, governance challenges persist, including risks of double counting, unverifiable offsets, and limited community inclusion that threaten market credibility and long-term sustainability (Agora Global, 2025). The tension between financial mobilization and genuine emission reduction remains unresolved, as some projects prioritise revenue generation over climate integrity (Cheffo, 2019).

Africa's carbon trading context is further shaped by its low per capita emissions ranging between 2.7 and 3.9 tonnes CO_2e, contrasted with its high sequestration potential through forests and land use (Cheffo, 2019). This paradox positions the continent as a net carbon sink, yet its participation in global markets remains constrained by technical limitations and regulatory gaps (Zhakata, 2024). Socio-economic integration is essential, as carbon markets must deliver co-benefits such as income stability, infrastructure development, and climate resilience, particularly for marginalized communities (Agora Global, 2025). Transparent benefit-sharing models and inclusive governance are critical to avoid exacerbating land tenure inequalities and social exclusion (Mwenya, 2012). Ultimately, aligning carbon trading with poverty alleviation and inclusive growth requires tailored regulatory frameworks, capacity building, and outcome-based finance to support Africa's low-carbon transition (GIZ, 2024; Queku & Seidu, 2025).

Carbon trading systems across Asia, Latin America, and Africa reveal a complex interplay of institutional maturity, stakeholder engagement, and ecological potential. While each region demonstrates unique strengths, persistent barriers continue to constrain market scalability, equity, and environmental integrity.

Asia's carbon markets, particularly China and South Korea, exhibit advanced compliance frameworks with legally binding caps and robust MRV systems (Gupta *et al.,* 2024; Asia Society Policy Institute, 2022). Yet,

China's ETS suffers from weak price signals averaging below USD 10/tCO_2e and free allocation practices that undermine efficiency. Southeast Asian nations rely heavily on voluntary markets, where REDD+ and rice carbon farming are gaining traction, but scalability is hindered by methodological gaps and limited regional integration (ASEAN Climate Resilience Network, 2023; Streck, 2021). Promoters such as Korea's benchmarking methodologies and Indonesia's IDXCarbon platform signal growing institutional commitment and digital innovation.

Latin America leads in voluntary market participation, leveraging forest-based offsets and REDD+ initiatives, particularly in Brazil, Peru, and Chile (Bataille *et al.,* 2020; Oliveira *et al.,* 2019). Compliance mechanisms are emerging, with Mexico's pilot ETS and Colombia's hybrid tax-offset model offering innovative pathways (Sullivan *et al.,* 2021). However, fragmented governance, offset credibility concerns, and lack of harmonised pricing instruments impede regional integration. Promoters include the region's biodiversity assets, hybrid policy experimentation, and regional dialogues such as REDiCAP that aim to coordinate carbon pricing frameworks and facilitate cross-border credit trading (UNFCCC, 2024).

Africa's carbon trading landscape is nascent but rapidly evolving, driven by voluntary markets and initiatives like the Africa Carbon Markets Initiative (ACMI) that aims to retire 300 million credits annually by 2030 (ACMI, 2024; AUDA-NEPAD, 2024). Despite its high sequestration potential and low per capita emissions, Africa faces significant barriers: limited MRV infrastructure, unverifiable offsets, donor-driven governance, and exclusion of Indigenous communities (Cheffo, 2019; Zhakata, 2024). Promoters include Article 6 pilot programmes, regional capacity-building efforts, and the strategic roadmap of ACMI that seeks to democratize access and enhance credit quality.

Comparatively, Europe's EU ETS remains the benchmark for regulatory maturity, price stability, and sectoral breadth, with reforms such as auctioning and the Market Stability Reserve enhancing integrity (Perino *et al.,* 2022; European Commission, 2023). North America's subnational systems, California's Cap-and-Trade and RGGI, demonstrate decentralised innovation and revenue recycling (Kotzampasakis & Woerdman, 2020). Australia's restructured market emphasises nature-based solutions and Indigenous inclusion, though liquidity and offset integrity remain concerns (Carbon Market Institute, 2024). These systems offer templates for MRV rigor and financial integration, yet remain largely inaccessible to Global South actors due to legal asymmetries and infrastructural limitations (OceanBlocks, 2025).

The comparative findings underscore that market maturity does not guarantee equity or environmental integrity. Asia and Latin America show greater institutional sophistication than Africa, yet all three regions face challenges in stakeholder inclusion, offset credibility, and benefit-sharing. Governmental actors in Asia and Latin America actively shape market architecture, whereas African governments often rely on international partnerships. Private sector engagement is robust in Asia and Latin America but limited in Africa. Civil society and Indigenous communities remain underrepresented across all regions, despite their critical role in forest-based offsets and project legitimacy.

Methodological integrity and transparent registries are foundational to market credibility. Asia's digital MRV systems and Latin America's third-party certifications contrast with Africa's fragmented verification infrastructure, highlighting the need for capacity-building and registry interoperability. Carbon prices in Asia and Latin America remain below global benchmarks, limiting abatement incentives. Financial instruments such as futures and green bonds are emerging but risk disconnecting climate outcomes from speculative trading. Africa's market remains largely unfinancialised, presenting both a challenge and an opportunity for inclusive design.

Global frameworks such as Article 6 must be locally adapted to avoid top-down imposition and ensure environmental justice. Interoperable governance models and inclusive stakeholder engagement are essential to bridge the gap between Global North regulatory depth and Global South ecological potential. It os learnt that:

- Effective carbon trading requires robust legal frameworks, MRV systems, and stakeholder coordination. Africa's scalability depends on sustained investment in institutional infrastructure.
- Latin America and Africa must address offset quality, permanence, and additionality to maintain market credibility and attract sustainable finance.
- Indigenous and civil society inclusion is essential for equitable benefit-sharing and long-term project viability.
- Asia's and Latin America's fragmented markets would benefit from regional ETS integration, harmonised standards, and cooperative pricing instruments.
- Article 6 and international standards must reflect local socio-political realities to avoid top-down imposition and ensure environmental justice.

The chapter examined the dynamics, mechanisms, and stakeholder configurations shaping carbon trading systems across Asia, Latin America, and Africa, with comparative reference to Europe, North America, and Australia. It highlighted how carbon markets function as key instruments in climate governance, enabling emissions reduction through both compliance and voluntary frameworks. Asia's carbon markets, led by China and South Korea, demonstrate institutional maturity and digital MRV integration, but face challenges in price signalling, regional coordination, and methodological scalability. Latin America leads in voluntary market participation, particularly through REDD+ and nature-based solutions, yet struggles with fragmented governance and offset credibility. Africa's carbon trading landscape is emergent, marked by high sequestration potential and strategic initiatives like ACMI, but constrained by limited infrastructure, donor-

driven governance, and exclusion of Indigenous actors. Stakeholder analysis revealed that governments and private sector entities in Asia and Latin America actively shape market architecture, while African governments rely more on international partnerships. Civil society and Indigenous communities remain underrepresented across all regions, despite their central role in forest-based offsets and project legitimacy. Comparative insights from mature systems in Europe, North America, and Australia underscore the importance of robust MRV systems, financial integration, and regulatory depth. However, these platforms remain largely inaccessible to Global South actors due to legal and infrastructural asymmetries. The chapter concludes that effective carbon trading requires not only technical and financial infrastructure, but also inclusive governance, regional coordination, and adaptive policy frameworks. These elements are essential for transforming carbon markets into equitable and impactful climate solutions.