Governance and Development Advisory

Policy Brief

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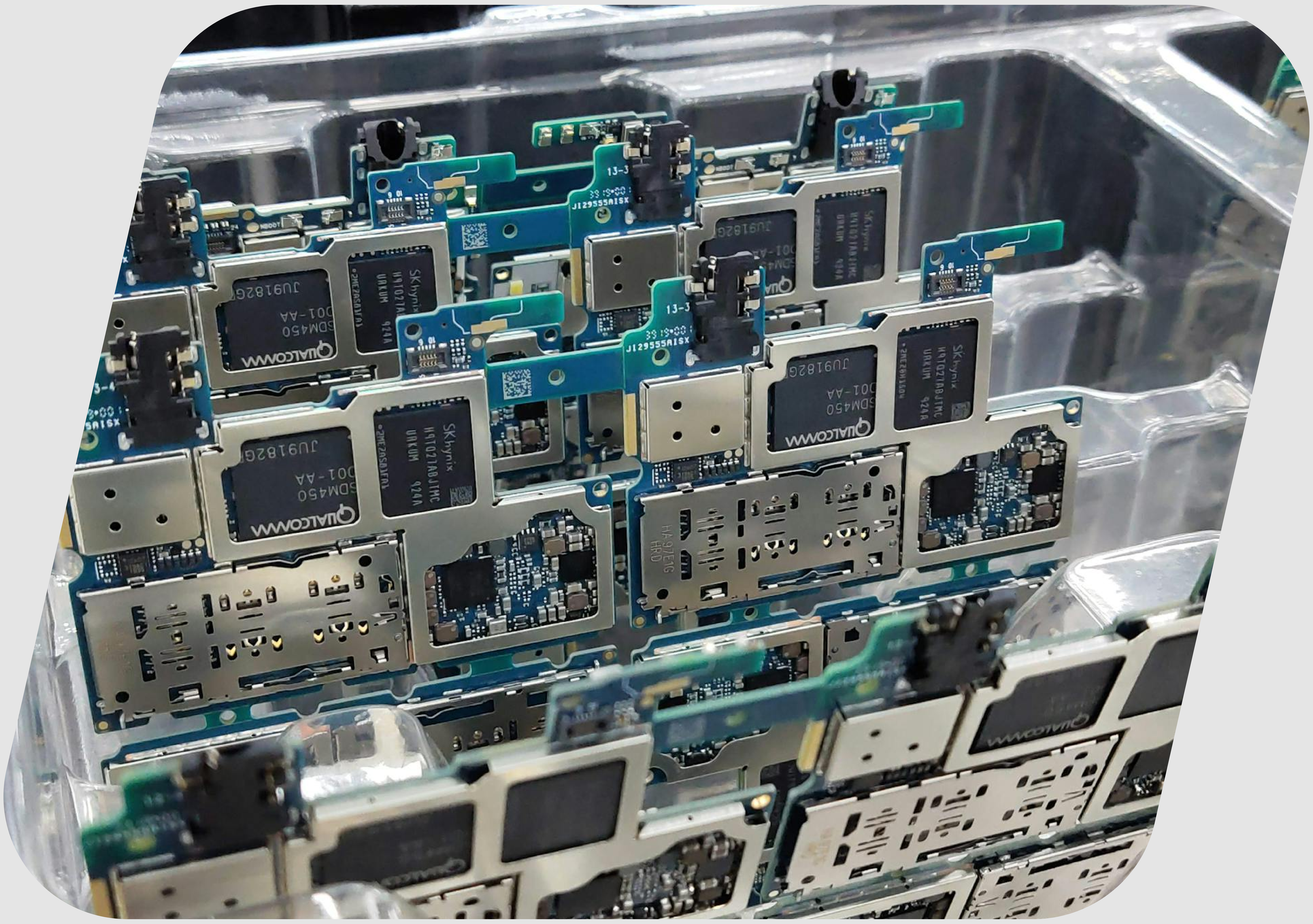
No Chips, No Power: Why Africa Must Enter the Global Semiconductor Global Value Chain



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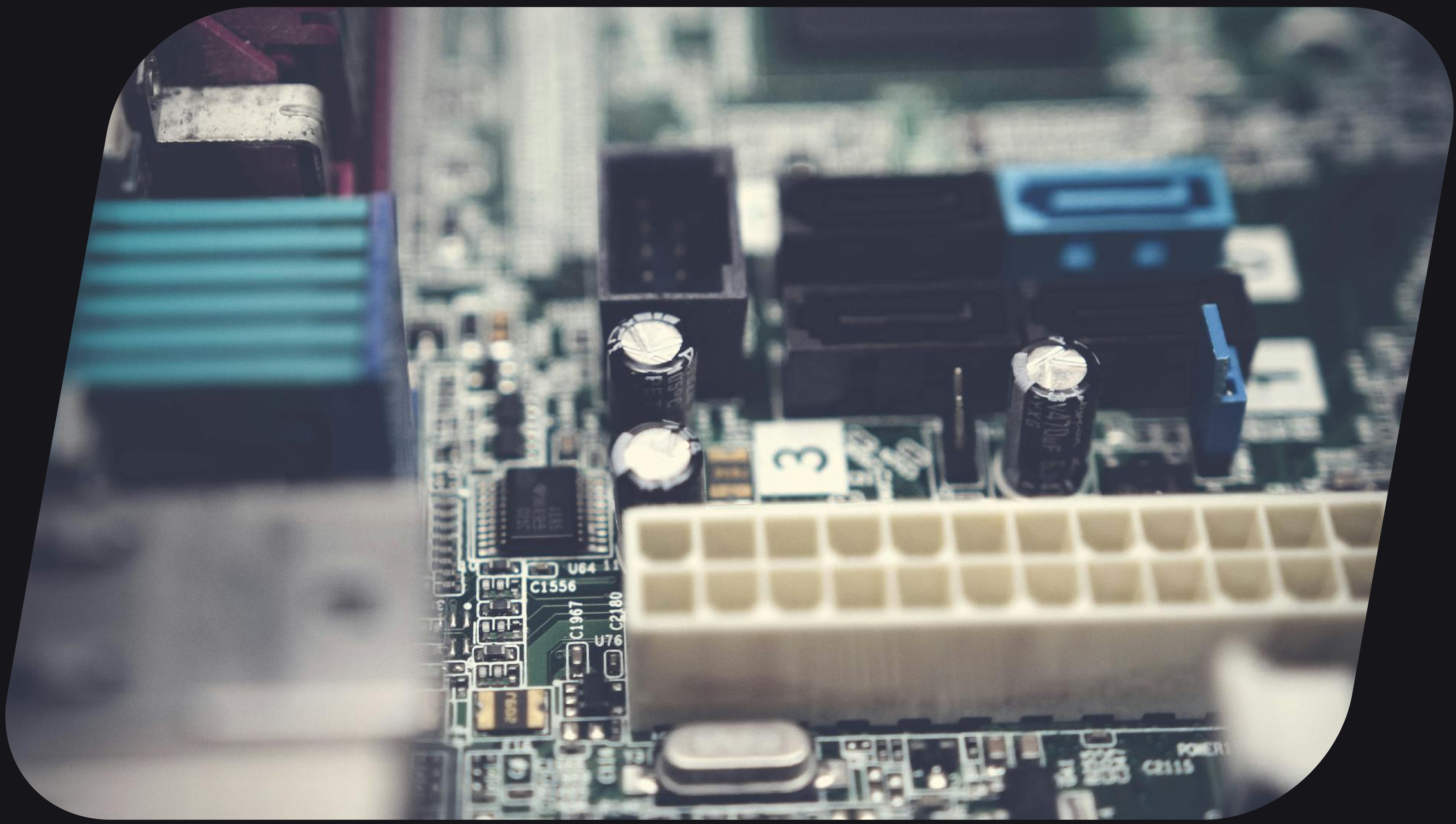
Executive Summary

This policy brief argues that Africa's continued exclusion from the semiconductor global value chain (GVC) is not merely a technological gap but a structural development constraint that risks locking the continent into long-term technological dependence.

Semiconductors have become the backbone of modern economies, underpinning digitalisation, industrial automation, renewable energy systems, defence, healthcare, and emerging technologies such as artificial intelligence and electric mobility. Yet Africa remains almost entirely absent from the global semiconductor value chain, participating mainly as an end market rather than as a producer or strategic node.

Recent global supply chain disruptions, geopolitical tensions, and industrial policy shifts in the United States, Europe, and Asia have created a narrow but critical window of opportunity for latecomer regions. Africa can leverage its growing electronics demand, strategic mineral endowments, and regional integration initiatives, especially the African Continental Free Trade Area (AfCFTA), to enter selected segments of the semiconductor value chain.

Entry does not require replicating advanced wafer fabrication at scale in the short term; instead, it calls for a phased, strategic approach focused on design services, assembly, testing, and packaging (ATP/OSAT), compound semiconductors, power electronics, and ecosystem-building capabilities.



Why Semiconductors Matter for Africa’s Development

Semiconductors are no longer a niche industrial input. Semiconductors are a general-purpose technology, serving as the backbone of the twin transition and beyond, hence their underlying national security imperative. Reflecting their strategic centrality, the global semiconductor industry is projected to exceed one trillion dollars by 2030.[1] Despite these, Africa remains largely invincible in the global semiconductor value chain.

A few African countries, such as South Africa, Egypt, Morocco, and Kenya, have begun to show aspirations and/or develop pockets of capability in electronics, design support, or systems integration.[2],[3],[4] However, the semiconductor innovation system in these countries remains marginal, fragmented, and embryonic. This makes them incapable of anchoring sustained participation in semiconductor production networks, let alone in high-value-added tasks.

Africa’s current position in the global semiconductor value chain creates persistent trade deficits, heightens exposure to supply vulnerabilities, limits opportunities for technological learning, and forecloses positive developmental externalities, such as attracting complementary investments and developing stronger innovation ecosystems. More fundamentally, it reinforces Africa’s marginal position in advanced manufacturing and weakens prospects of leveraging the global twin transition for structural transformation.

Without deliberate action, the continent risks being locked into long-term technological dependence at the moment when global value chains are being reorganised, and new entry points are emerging.

[1] https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-a-semiconductor
[2]https://african.business/2024/03/technology-information/africa-looks-to-muscle-in-on-the-semiconductor-value-chain
[3] https://oec.world/en/profile/hs/semiconductor-devices?selector2767id=trade_i_baci_a_17
[4] https://nairametrics.com/2024/02/27/positioning-africa-as-a-key-player-in-the-global-semiconductor-ecosystem/

Key Stages of the SemiconductorValue Chain

The semiconductor industry is organised as a highly fragmented but tightly coordinated global value chain, with distinct stages that differ markedly in capital intensity, skill requirements, technological complexity, and entry barriers. [5],[6]

The value chain begins with upstream inputs, including raw materials (such as high-purity silicon), semiconductor-grade minerals, and manufacturing equipment. These activities are knowledge- and capital-intensive and dominated by a small number of global suppliers. Still, they also create opportunities for materials processing, equipment servicing, and industrial inputs linked to mining and chemicals.

This is followed by chip design, where firms develop integrated circuit architectures and system-level designs. Design is increasingly separated from manufacturing through the rise of the fabless model, allowing countries without fabrication plants to participate through human capital, software capabilities, and digital infrastructure.

The most capital-intensive stage is wafer fabrication (front-end manufacturing), where chips are physically produced on silicon wafers in highly automated fabrication plants (fabs). Leading-edge fabs require investments running into tens of billions of dollars, advanced process know-how, and deep integration into global technology ecosystems.

Once wafers are produced, chips move to assembly, testing, and packaging (ATP or OSAT).[7] These back-end activities are essential for transforming wafers into usable chips and ensuring performance, reliability, and quality. OSAT is significantly less capital-intensive than fabrication, more labour-absorbing, and has historically served as a key entry point for latecomer economies such as Malaysia.[8]

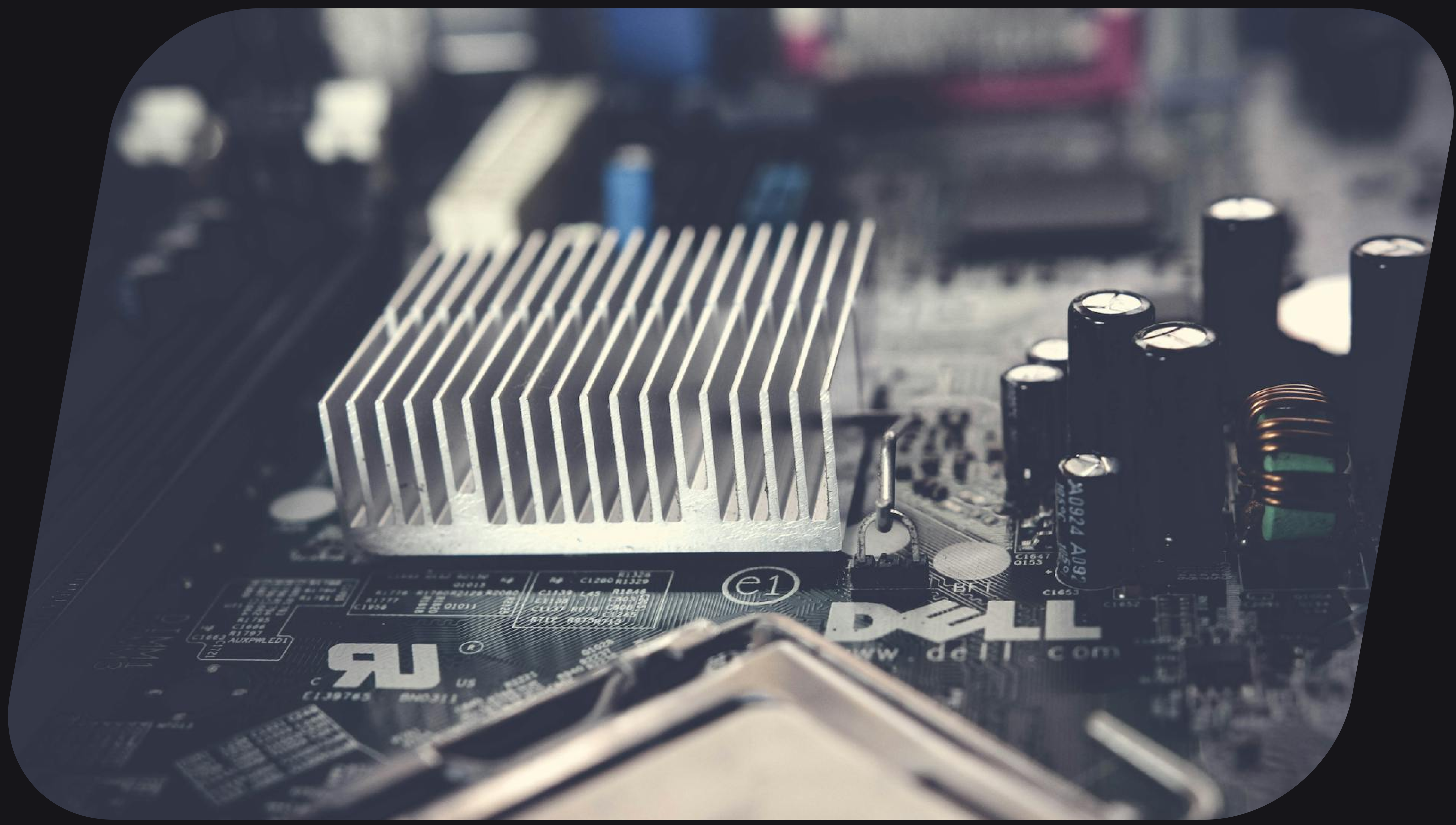
Downstream, semiconductors are integrated into electronic systems and end products, including consumer electronics, renewable energy systems, vehicles, industrial machinery, and digital infrastructure.

[5] https://www.wto.org/english/res_e/booksp_e/gvc_dev_rep23_e.pdf

[6] Faber, F (2025). Innovation system evolution and value chain positioning: Lessons from Malaysia's semiconductor sector for latecomer economies (Unpublished TU Delft thesis)

[7] Outsourced semiconductor assembly and test

[8] Faber, F (2025). Innovation system evolution and value chain positioning: Lessons from Malaysia's semiconductor sector for latecomer economies (Unpublished TU Delft thesis)



Global Shifts Create a Strategic Opening

Currently, the United States, Europe, and parts of Asia [see Figure 1]. However, the global semiconductor industry is undergoing profound reorganisation.[9],[10] Geopolitical rivalries, the resurgence of industrial policy, and supply chain security concerns have led firms and governments to seek diversification beyond traditional hubs in East Asia. The US CHIPS Act, the EU Chips Act, and similar initiatives in Japan and India signal a move away from hyper-concentrated production systems. This creates opportunities for new locations that can offer political alignment, market growth, cost advantages, and long-term strategic partnerships.

Africa's growing population,[11] rising electronics consumption,[12] and strategic positioning between major markets makes it increasingly relevant in global semiconductor diplomacy. However, without deliberate policy action, Africa risks being bypassed once again as new semiconductor geographies consolidate elsewhere.

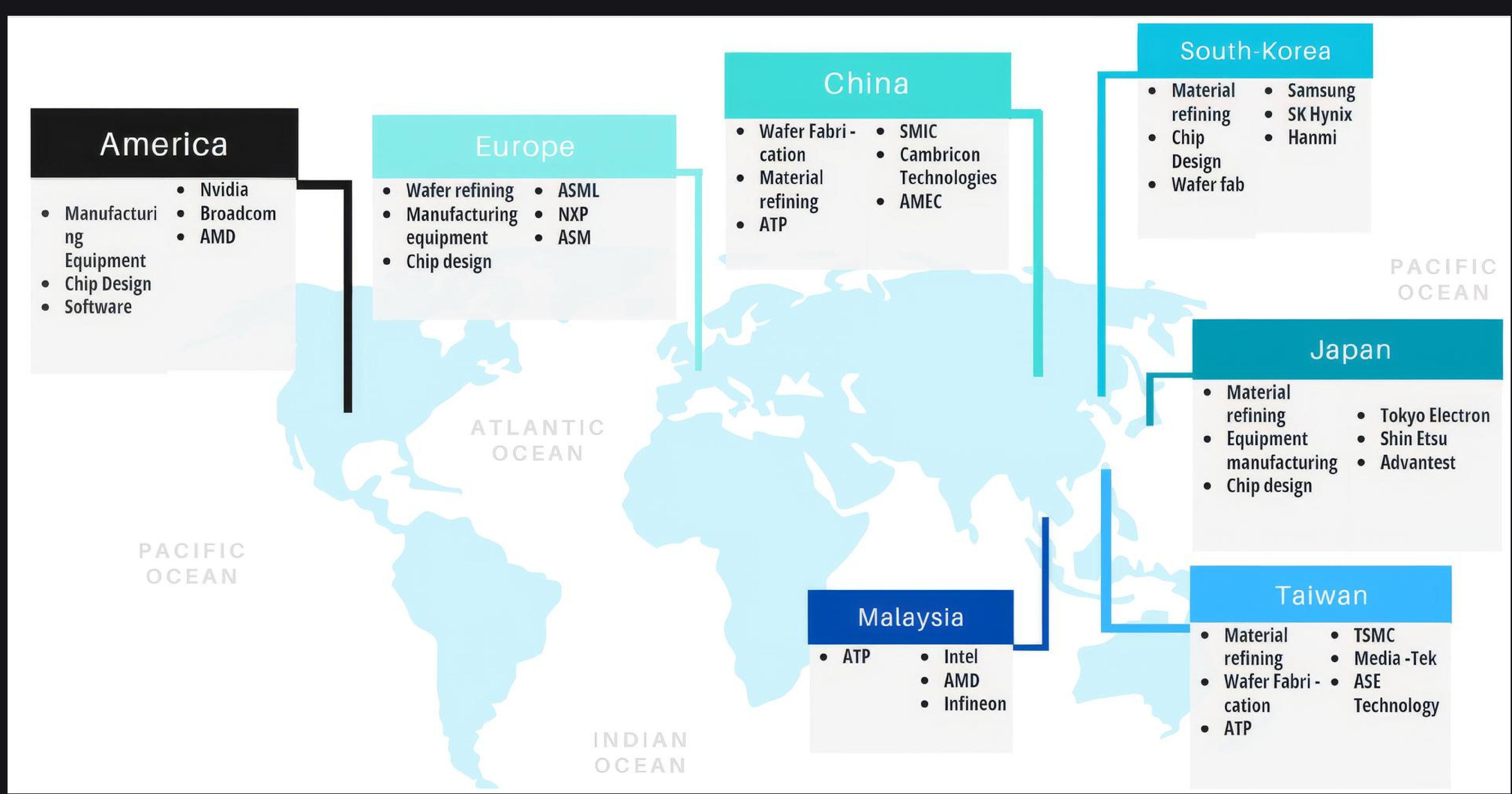


Figure 1: Mapping the Semiconductor Global Industry

Faber [2025] based on data extracted from Varas et al. [2021] [13]

[9] https://www.pwc.com/gx/en/industries/technology/pwc-semiconductor-and-beyond-2026-full-report.pdf
[10] https://futurumgroup.com/press-release/u-s-geopolitics-will-speed-up-semiconductor-supply-chain-deglobalization/
[11]https://www.uneca.org/stories/%28blog%29-as-africa's-population-crosses-1.5-billion%2C-the-demographic-window-is-opening-getting
[12]https://www.statista.com/outlook/emo/electronics/africa?srsltid=AfmBOoqnWLSZokXfj9XY7k7n_dLJfkaN7eFrXSA93hhOMf8HXc6LhmR6
[13] Faber, F (2025). Innovation system evolution and value chain positioning: Lessons from Malaysia's semiconductor sector for latecomer economies [Unpublished TU Delft thesis]

Africa's Latent Advantages

Despite Africa’s current absence in the semiconductor GVC, it possesses several underutilised assets relevant to semiconductor GVC entry.

First, the continent holds significant reserves of semiconductor-relevant minerals, including silicon feedstock, gallium, cobalt, tantalum, and rare-earth elements. While mineral endowments alone do not guarantee industrial upgrading, they provide leverage for negotiating deeper value-chain participation when combined with coherent industrial policy.

Second, Africa’s electronics market is expanding rapidly, driven by mobile penetration, renewable energy systems, consumer electronics, and automotive imports and assembly.[14],[15] This creates a demand-side pull that can support early-stage assembly, testing, and power semiconductor activities.

Third, Africa has a growing base of engineers, software developers, and STEM graduates, particularly in countries such as South Africa, Tunisia, Egypt, Kenya, Mauritius, Nigeria, and Rwanda.[16],[17] While skills gaps remain significant, targeted capability-building can enable entry into design support, verification, and embedded systems.

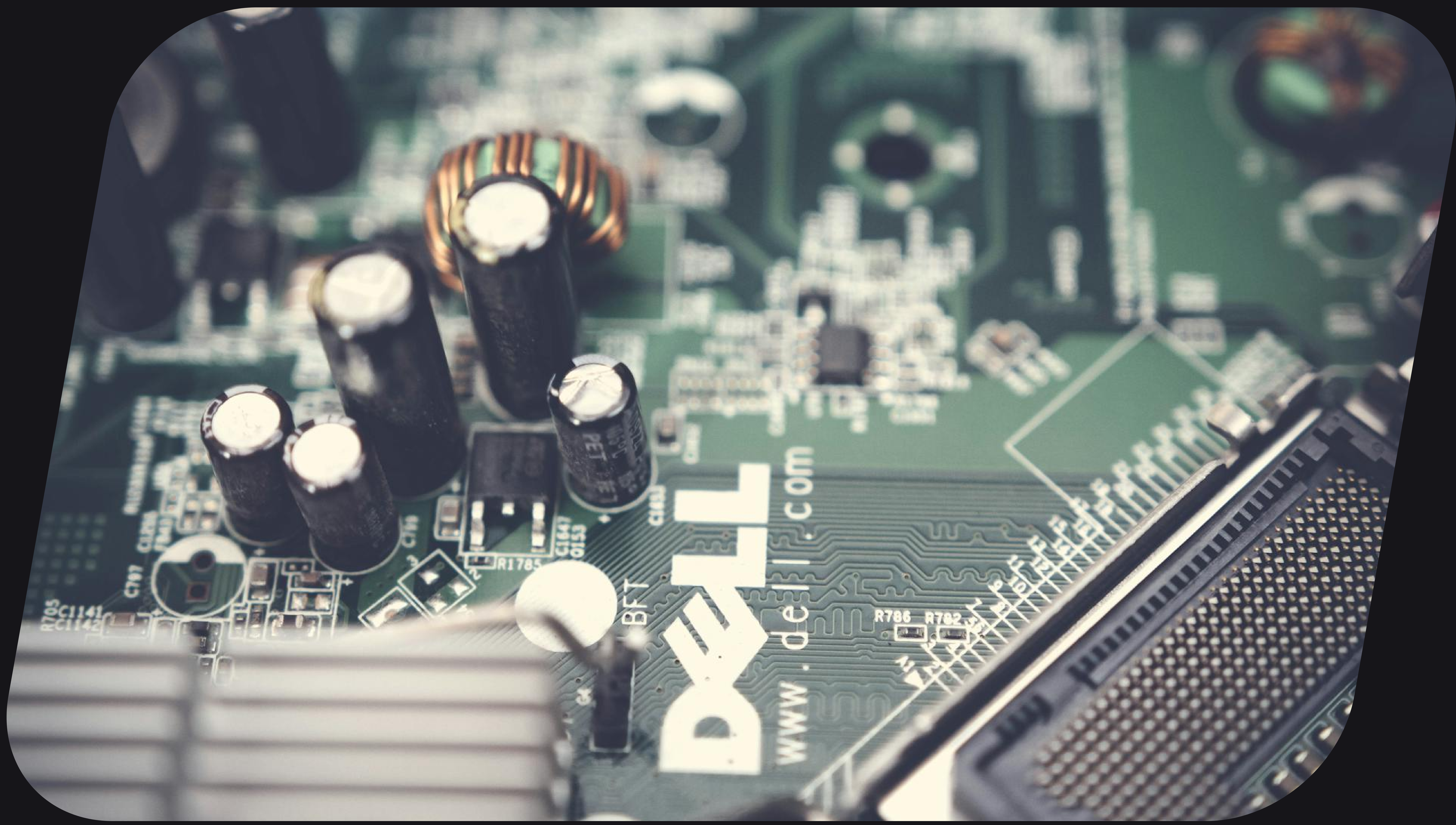
Finally, AfCFTA offers a unique platform for regional specialisation and scale. Semiconductor ecosystems are inherently regional rather than national. Africa's ability to pool markets, skills, and infrastructure is a critical advantage when coordinated effectively.

[14]https://www.statista.com/outlook/emo/electronics/africa?srsltid=AfmBOoqnWLSZokXfj9XY7k7n_dlJfkaN7eFrXSA93hhOMf8HXc6LhmR6; https://africa-hr.com/blog/expanding-in-the-electronics-sector/

[15] https://africa-hr.com/blog/expanding-in-the-electronics-sector/

[16] https://talentindex.ai/AI%20Talent%20Readiness%20Index%20for%20Africa%20[3].pdf

[17] https://tunga.io/african-software-developers/



Realistic Entry Points into the Semiconductor GVC

Africa should avoid attempting to leap directly into capital-intensive, leading-edge wafer fabrication. Instead, a phased strategy focused on feasible segments can create learning, jobs, and opportunities for upgrading.

One priority entry point is ATP/OSAT. These segments are both labour-absorbing and less capital-intensive than fabrication. Countries such as Malaysia demonstrate how ATP/OSAT can serve as a foundation for deeper upgrading over time.[18]

A second entry point lies in chip design services and system-level design, particularly for application-specific integrated circuits (ASICs) and power electronics. As noted in section 2, Fabless design does not require fabs, allowing them to operate with a lighter capital structure.[19] However, Africa will require robust human capital, digital infrastructure, and strong links to global foundries to unlock the opportunities here.

Third, Africa can target compound semiconductors and power electronics linked to renewable energy, electric mobility, and industrial power management. These segments align closely with Africa’s green transition agenda and growing energy needs.

Finally, supporting industries, such as equipment maintenance, materials processing, metrology, and testing services, offer additional avenues for participation and learning.

[[18] Faber, F (2025). Innovation system evolution and value chain positioning: Lessons from Malaysia’s semiconductor sector for latecomer economies (Unpublished TU Delft thesis)
[19] https://www.vaneck.com/us/en/blogs/thematic-investing/fabless-chip-designers-shaping-the-future-of-semiconductors/

Policy Recommendations

Failure to integrate into the semiconductor Global Value Chain (GVC) threatens to cement Africa's technological dependency and undermine its green and digital sovereignty. Without a strategic foothold, the continent risks a 'value trap'where we export technological raw minerals while importing high-cost, finished technologies. In an era of politicised tech access, remaining outside the semiconductor ecosystem compromises national security and industrial resilience.

At the continental level, the African Union should recognise semiconductors as a strategic industrial priority, embedded within Agenda 2063 and Africa's digital and industrial strategies. A Pan-African Semiconductor Initiative could coordinate skills development, research networks, and partnerships with global firms.

At the regional level, Regional Economic Communities (RECs) should promote functional specialisation—design hubs in some countries, ATP/OSAT clusters in others, and shared testing and certification facilities—to avoid duplication and fragmentation.

At the national level, governments should adopt targeted semiconductor roadmaps linked to broader industrial policy goals. Priority actions include investing in engineering education, offering incentives for ATP/OSAT and design firms, establishing trusted regulatory environments, and leveraging public procurement in energy, telecoms, and defence to create early demand.

For development finance institutions, concessional finance and risk-sharing instruments are essential to crowd in private investment, particularly in early-stage ecosystem development.

Conclusion

Africa's entry into the global semiconductor value chain is not a question of ambition but of strategic necessity. The continent does not need to replicate the full semiconductor stack overnight. What it needs is to enter intelligently, selectively, and collectively.

By leveraging current global shifts, regional integration, and its latent capabilities, Africa can position itself as a credible participant in the semiconductor economy. This will support structural transformation, technological learning, and long-term economic resilience. The cost of delay is high, but the opportunity, if seized now, is transformative.

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