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Public–Private Partnership Models For Industrialization Under The African Continental Free Trade Area

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Abstract: The article presents an analysis of public–private partnership (PPP) models as an instrument of industrialization in the context of the African Continental Free Trade Area (AfCFTA). The study is based on an interdisciplinary approach combining institutional economics, comparative analysis of macroeconomic forecasts and empirical data, and analytical reconstruction of PPP practices. Particular attention is given to comparing the results of computable general equilibrium models with actual data from East and South African countries. It is established that the key constraints are logistical barriers, fragmentation of energy markets, and institutional heterogeneity of national economies. The study shows that public–private partnerships ensure the mobilization of private capital, compensation for limited public resources, and the development of infrastructure and industrial projects. The strategic role of technological and financial mechanisms, such as additive manufacturing and green finance, is highlighted as they provide the foundation for sustainable growth and risk reduction. Comparative analysis confirmed that the effectiveness of PPPs is determined by a combination of institutional harmonization, infrastructure modernization, and the integration of innovative practices. The paper proposes a conceptual framework for improving the effectiveness of PPPs within AfCFTA, including the development of unified partnership models, the adaptation of financing mechanisms, and the use of technological drivers of industrialization. The article will be useful for

researchers in international economics, regional integration specialists, experts in infrastructure development, and policymakers developing industrialization strategies in Africa.

Keywords: Public–private partnership, AfCFTA, industrialization, Africa, green finance, additive manufacturing, logistics, energy markets, regional integration, sustainable development.

Introduction:

Industrialization processes in Africa today define one of the key trajectories of global economic development. In the context of deepening global interdependence, the African continent is viewed as a space with unique growth potential, combining substantial natural resources, a growing young population, and dynamically developing domestic markets (Klenam, 2025). At the same time, structural weaknesses in the manufacturing sector, high dependence on raw-material exports, and limited infrastructure continue to serve as systemic barriers to sustainable development.

The establishment of the African Continental Free Trade Area (AfCFTA) is the largest integration project on the continent and simultaneously a challenge for national economies. Its implementation is expected to open new opportunities for market expansion, increase cross-border investment, stimulate technology transfer, and accelerate industrialization. Practical confirmation of the significance of such mechanisms can be found in the Unstoppable Africa initiative under the aegis of the UN Global Compact, where the alignment of governments, corporations, and international organizations made it possible to develop common approaches to investment and industrialization. This experience demonstrates that strategic state–business partnerships not only strengthen regional integration but also create the institutional foundation for achieving AfCFTA's objectives. However, success requires mechanisms that unite public and private effort in long-term strategic projects.

The relevance of this study lies in the role of public–private partnerships (PPP) as a key instrument for offsetting the shortfall in public resources while mobilizing private capital for large-scale infrastructure and industrial projects. The transition to Industry 4.0 and a "green economy" compels African countries to pursue catch-up growth and to develop their own models of technological and institutional modernization. Without robust PPP mechanisms, AfCFTA risks remaining primarily a trade agreement that fails to deliver an industrial breakthrough.

The institutional diversity of the continent creates a complex context for partnership implementation. Differences in the level of economic development, infrastructure provision, and legal systems generate risks of fragmentation and uneven distribution of the gains from integration (Pinto, 2025). Effective functioning of AfCFTA requires adaptive models that account for national specificities while aligning with pan-African objectives of sustainable growth and social inclusion.

The aim of the study is to analyze PPP models as an instrument of industrialization within AfCFTA and to identify their functional features and conditions for successful application to achieve sustainable economic growth.

Materials and Methods

The methodological framework combines content analysis with comparative and analytical approaches. Danfulani (2024) examines the application of PPP in ECOWAS strategy, which supports a comparative method for identifying common regularities and the specificities of regional partnership models. To clarify the institutional nature of the processes under review, the study considers Debrah's (2024) conclusions on AfCFTA implementation mechanisms and their implications for international business, as well as Onono (2024), which provides empirical assessments of the impact of trade liberalization on bilateral balances.

Comparisons were drawn between forecasts from computable general equilibrium models and actual data. Mhonyera (2023) presents a CGE model assessing AfCFTA's impact on trade and welfare, whereas Pinto (2025) proposes a conceptualization of structural transformations spanning technology, employment, and industrialization. This juxtaposition made it possible to link macroeconomic projections to the practice of institutional reform.

The analytical reconstruction of PPP models draws on institutional economics and agency theory. Li (2023) analyzes the risks and interests of project stakeholders, enabling identification of key conflict points between

public and private parties. Tipu (2024) demonstrates the influence of external uncertainty on PPP stability, allowing the study to isolate factors that ensure the resilience or vulnerability of such projects. Lwesya (2025) considers the role of green finance as an instrument for strengthening partnerships, while Kyriakarakos (2022) systematizes initiatives to harmonize Africa's electricity markets, laying institutional prerequisites for large-scale infrastructure PPP. In addition, the reconstruction of PPP models incorporates the Unstoppable Africa case as a platform for high-level engagement among public leaders, CEOs of transnational corporations, and development institutions. This case integrates the empirical experience of international events into the theoretical framework for analyzing PPP, underscoring the importance of communication strategies and event management as factors in economic transformation.

The set of methods applied provided a comprehensive treatment of the topic and made it possible to integrate the institutional, economic, and technological dimensions of PPP models in the context of AfCFTA implementation.

Results

Analysis of the macroeconomic consequences of AfCFTA indicates that impacts on key indicators are heterogeneous and depend on the institutional and structural characteristics of member countries. Mhonyera (2023) finds that, in the short term, the positive effects of trade liberalization manifest in rising aggregate welfare, but that gains are unevenly distributed across countries. The largest positive changes are recorded in Nigeria and South Africa, where income grows and trade flows expand, whereas in some less diversified economies the effect is less pronounced (Adewumi, 2021). This confirms that integration benefits depend on tariff reduction, the structure of export capabilities, and the capacity of industry to adapt to new competitive conditions.

Comparing forecast results with empirical data from the East African Community reveals substantial discrepancies. Onono (2024) analyzes changes in trade balances following tariff removal in Uganda, Kenya, Rwanda, and Tanzania. The effect in Uganda is positive, with a 6% improvement in the trade balance, whereas Kenya and Tanzania show negative trends associated with rising imports and limited diversification of export positions. In Rwanda the effect is statistically insignificant, explained by the small scale of national exports and high dependence on intermediate imports (Klenam, 2025). These results demonstrate that AfCFTA's macroeconomic effect cannot be assessed solely in terms of aggregate indicators; it requires differentiation by country and sector.

To systematize the observed differences, a comparative analysis of forecast and actual data was conducted. Table 1 presents the juxtaposition of welfare and trade gains for Nigeria and South Africa on the one hand, and changes in trade balances in East African countries on the other.

Table 1 – Comparison of Forecasted and Empirical Assessments of the Macroeconomic Effects of AfCFTA (Compiled by the author based on sources: (Mhonyera, 2023), (Onono, 2024))

Indicator	Country/Region	Result
Welfare gains	Nigeria, South Africa	Positive effect, sustained income growth
Change in trade balance	Uganda	Improvement by 6%
Change in trade balance	Kenya	Deterioration (negative balance)
Change in trade balance	Tanzania	Deterioration (negative balance)
Change in trade balance	Rwanda	Insignificant effect

The results in Table 1 confirm a structural gap between forecasts and real-world outcomes. While model-based assessments show predominantly positive effects in terms of welfare growth and trade expansion for the continent's largest economies, actual results in East Africa indicate limited or even negative effects for

specific countries. This underscores the need to factor in institutional and infrastructure conditions when analyzing integration initiatives and confirms that AfCFTA's potential can be realized only if accompanied by reforms in logistics, energy, and industrial policy.

Assessment of AfCFTA's prospects is impossible without analyzing logistics and infrastructure constraints, which significantly shape the scale of industrialization and the depth of integration. Nitsche (2024) finds that weak transport–logistics chains and high intra-African transport costs are key impediments to realizing AfCFTA's trade potential. Despite the removal of tariff barriers, transport corridors remain fragmented, raising transaction costs and reducing the competitiveness of regional producers.

These problems are exacerbated by insufficient coordination among national transport systems, low levels of logistics digitalization, and the absence of a unified regulatory standard for transport operators. These factors mean that the advantages of integration are realized only partially and primarily in countries with access to port infrastructure.

The energy base is of particular importance for industrialization. Debrah (2024) shows that harmonization of African energy markets remains incomplete. Despite the creation of policy and institutional mechanisms necessary to launch an African single electricity market, differences persist in national tariff systems, generation capacities, and regulatory approaches. These differences create barriers to cross-border energy investment and limit the ability to scale production capacity. Table 2 summarizes the main barriers, with emphasis on their implications for AfCFTA.

Table 2 – Logistical and Energy Market Barriers for AfCFTA Implementation (Compiled by the author based on sources: (Kyriakarakos, 2022), (Nitsche, 2024))

Barrier Type	Specific Issue	Consequence for AfCFTA Implementation
Logistics and Transport	High intra-African transport costs	Reduces competitiveness of regional exports
Logistics and Transport	Fragmented transport corridors	Increases transaction costs, slows trade flows
Logistics and Transport	Low digitalization of logistics	Limits efficiency and transparency of supply chains
Energy Markets	Divergent national tariff systems	Hinders creation of unified energy market
Energy Markets	Unequal generation capacities	Creates imbalance in industrial power supply
Energy Markets	Regulatory fragmentation	Restricts cross-border energy investments

As Table 2 shows, logistics and energy constraints are interrelated and form structural barriers to deepening regional integration. Overcoming them requires infrastructure investment and coordinated institutional reforms aimed at creating a unified regulatory environment and standardizing rules of engagement.

Discussion

AfCFTA's implementation faces a set of institutional and structural constraints that help explain the gap between forecast effects and observed integration outcomes. Nitsche (2024) shows that, despite the removal of tariff barriers, a large share of constraints are logistical and regulatory in nature. High intra-continental transport costs, fragmented infrastructure corridors, and the absence of unified standards for transport services lead to only partial realization of the rapid trade growth predicted by CGE models (Danfulani, 2024).

These institutional barriers are compounded by differences in monetary policy and macroeconomic

stability across countries. Onono (2024) finds that the effect of tariff removal within the East African Community is highly uneven: Uganda's trade balance improves, while Kenya and Tanzania record negative shifts, and Rwanda shows statistically insignificant changes. These data indicate that, even under a common set of integration rules, AfCFTA outcomes are shaped by national structural characteristics, including exchange-rate volatility, domestic demand, and the degree of economic diversification.

Macroeconomic factors significantly influence the distribution of integration gains. Mhonyera (2023) shows that in Nigeria and South Africa the positive effect appears as sustained welfare growth, linked to advanced industrial capacity and a more stable macroeconomic environment. By contrast, East African countries, despite access to a common market, face exchange-rate volatility and limited capacity to import equipment, dampening the benefits of trade liberalization.

Regional specificities are reinforced by institutional fragmentation. Kyriakarakos (2022) underscores that incomplete harmonization of energy markets impedes industrialization and the integration of value chains. The absence of a unified electricity market creates a divide between countries with surplus generation and those with chronic energy deficits, limiting the even distribution of AfCFTA gains.

Another factor constraining realization of projections is the weakness of financial mechanisms supporting integration. Lwesya (2025) emphasizes that the development of green finance in Africa faces institutional barriers and low coordination, which limits financing opportunities for industrial and infrastructure projects.

The effectiveness of PPP under AfCFTA conditions is largely determined by the institutional environment and the availability of modern technological and financial instruments. In this context, the Unstoppable Africa case is illustrative: the platform brought together more than 5,000 participants online and offline, catalyzed intergovernmental memoranda, and elicited corporate investment commitments. Such outcomes confirm that event-based PPP initiatives can accelerate institutional reforms, reduce the time cost of strategic alignment, and strengthen trust among key market actors.

Among the relevant instruments, additive manufacturing technologies and green-finance mechanisms are particularly salient. They support the formation of a production base less dependent on traditional infrastructure and provide sustainable financing models aligned with long-term resilience and risk reduction. Table 3 compares the contributions of additive manufacturing and green finance to PPP development.

Table 3 – Comparative role of additive manufacturing and green finance in PPP strengthening (Compiled by the author based on (Klenam, 2025), (Lwesya, 2025))

Mechanism	Key Contribution to PPP	Broader Impact on AfCFTA
Additive manufacturing	Reduces dependence on imported inputs; enables localized and flexible production	Facilitates industrial clusters; promotes technology transfer; enhances inclusivity
Green finance	Provides sustainable funding via green bonds, climate funds, and loans	Aligns projects with SDGs; attracts international investors; fosters climate resilience

Klenam (2025) presents additive manufacturing as a strategic technological pathway for Africa's sustainable industrialization. Unlike traditional production models, this technology reduces reliance on large-scale imports of intermediate goods and enables localized, more flexible manufacturing. It expands PPP opportunities, lowers the costs of building industrial clusters, increases adaptability to demand fluctuations, and stimulates technology transfer within regional markets. Moreover, the adoption of additive manufacturing reduces

infrastructure disparities among countries and creates conditions for more inclusive participation in AfCFTA-related value chains (Tipu, 2024).

PPP financial sustainability depends heavily on effective financing mechanisms. Lwesya (2025) stresses that green finance serves a dual function. It provides access to capital for industrial and infrastructure projects while ensuring that such investments meet international environmental sustainability standards. Green bonds, climate funds, and loans linked to the Sustainable Development Goals allow projects to be assessed not only by profitability but also by their contribution to decarbonization and climate adaptation (Pinto, 2025).

In sum, technological and financial mechanisms create a dual foundation for improving PPP outcomes. On the one hand, additive manufacturing acts as a technological driver that lowers barriers to industrial participation. On the other, green finance attracts long-term capital and integrates projects into sustainable development models. Their combination establishes the basis for a more balanced and competitive industrial base in Africa under AfCFTA.

Conclusion

This study systematizes PPP models in the context of AfCFTA implementation and identifies their pivotal role in shaping Africa's industrial base. It finds that PPP effectiveness is determined by the combination of institutional environment, financing mechanisms, and technological drivers capable of offsetting infrastructure and structural constraints.

Comparative–analytical review of macroeconomic forecasts and empirical data confirms a gap between model estimates and observed outcomes, driven by logistics barriers, fragmented energy markets, and heterogeneous institutional conditions. PPP's practical significance lies in its ability to mobilize private capital and reduce reliance on limited public resources; at the same time, effectiveness depends directly on the coherence of reforms and adaptation to national specificities.

The study identifies technological and financial mechanisms—additive manufacturing and green finance—as a dual foundation for enhancing PPP resilience. The former reduces import dependence and supports localized production, while the latter ensures a long-term financial base and adherence to international sustainability standards. Together these factors amplify AfCFTA's potential as an instrument of industrial growth and social inclusion.

Particular attention is given to institutional barriers related to fragmented regulation, weak coordination among national transport systems, and differences in energy-market tariff regimes. These constraints significantly limit the scale of integration and call for adaptive PPP models that account for national contexts while upholding pan-African goals of sustainable development.

Accordingly, PPP under AfCFTA should be viewed as a multi-level instrument of industrialization, where success hinges on infrastructure modernization, institutional harmonization, technological innovation, and the mobilization of sustainable finance. Future research should focus on developing unified PPP models for different African regions, refining mechanisms for integrating green finance and technologies into industrial policy, and assessing AfCFTA's long-term impact on structural transformation and the continent's economic resilience.

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