

Retooling Industrial Technology Acquisition in Africa

Makhetha S. Leseke and Dodoo-Amoo Eric Nii Amu Okotokata
Peking University

Summary

Why did Africa fail to take-off in the 1950s? Different schools of development thoughts attempted to address this question, nonetheless to vain. Post-World War II, some Asian economies including Japan, Singapore, Taiwan, and Hong Kong converged their growth to that of industrialized economies. During the same take-off stage for many economies, Africa retained the lowest per capita GDP. Therefore, the objective of this paper is to provide a feasible strategy for industrial technology acquisition. The main conclusion is that if African industrial policymakers can carefully redesign industrial policies that are centric to technology, industrialization process is bound to speed up in the continent.

Brief Background on Industrial Revolution

The period before the industrial revolution has been characterised by the flat world. That is before 1820, which marks the industrial revolution, the per capita gross domestic product (GDP) was almost similar for all world economies. As depicted in Figure 1, since 1820, the per capita GDP of Western Europe and Western

Offshoots picked rapidly while the rest of the economies lagged behind [see also (Bolt, Timmer and van Zanden, 2014)]. These Western economies were said to be industrialized economies. In the 1970s again, economies including, Japan, Eastern Europe, Former Soviet Union (USSR) economies, and Latin America started to grow faster. Post-World War II, some Asian economies including Japan, Singapore, Taiwan, and Hong Kong converged their growth to that of industrialized economies. During the same take-off stage for many economies, Africa retained the lowest per capita GDP. The failure for Africa to take-off since World War II has been the topic of fierce debate. Amongst the other things, technological skills in industrial innovation have been controversial discourse [see (Yao, 2013; Garcia Calvo, 2014; Demirova, 2018)].

Why did Africa fail to take-off in the 1950s? Different schools of development thoughts attempted to address this question. For instance, the structuralism development thinking that emphasized import-substitution strategies was already questioned in the early 1960s to late 1970s. The alternative to structuralism economic thinking was liberalism thinking that largely

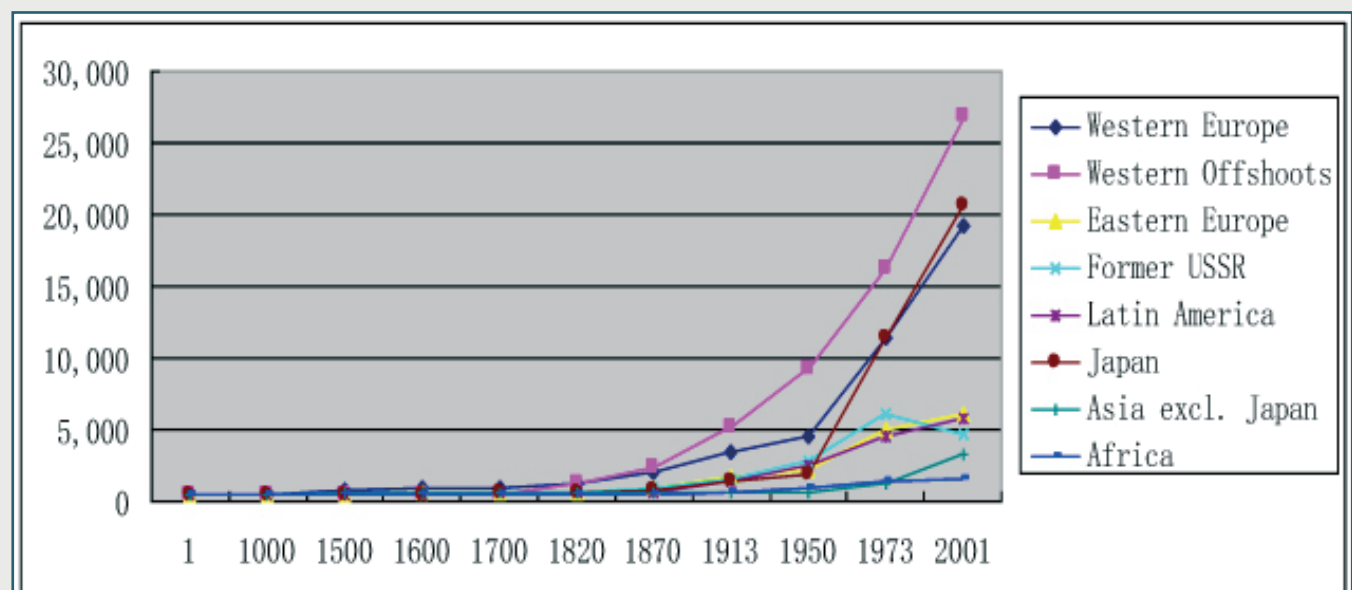


Figure 1: Per capita GDP trends before and after industrial evolution.

Source: Clio-Infra, www.clio-infra.eu.

followed the 1980 Washington Consensus. Washington Consensus like structuralism development thinking was vain. To address the shortcoming of these development thinking (Lin, 2011) also provide a framework for new developing thinking (the New Structural Economics) which asserts that development take-off is determined by relative endogenous factor abundance that conforms to each industrial stage of the economy. Despite these revitalizing development efforts, Africa remained stagnant below the average per capita GDP of \$3,000 while some countries grew by more than five-folds to that of Africa. The second most controversial discourse is the impact of globalization on African growth, as globalisation triggers a pensive examination of how technological spillovers from advanced to low developed economies should be actualized. Albeit many scholars including (Mayer, 2002) postulate that global economic integration, a concept that emerged as early as in the 15th century, pre-conditions the industrial and/or technological skill; the most conspicuous question would then be; why is there no substantial skill convergence between industrialized and African economies?

While the failure of Africa to fully industrialize remains a paradox, it even becomes convoluted to understand how some low developed economies such as China whose per capita GDP was \$156 in 1978 (equivalent to one-third of the average of Sub Saharan Africa) was able to achieve a high middle-income status in 30 years, recording the per capita GDP of more than \$10,000 in 2019. Despite the paramount role of industrialisation for African development, the theories that explain explicitly how technological skills are acquired in industrialization literature are scant. The lack of industrial skills in Africa is not only disadvantaging Africa, but also multinational enterprises investing in Africa. For instance (Thompson, 2019) shows that a Beijing Industrial Automobile Corporation lost \$11 billion investment in Coega Special Economic Zones in South Africa due to a lack of local industrial skills. To address the issue of inadequate industrial skills (Alexander, 2013) gives only a policy briefing on the significance of industrial skill acquisition, without giving any highlight of how such skill is acquired. In addition, a substantial amount of literature emphasizes the importance of attachments in high-capital corporations [for example, see (Joseph et al., 2017)]. However, attachments have proven to be ineffective as they are not cross-country attachments, thus resulting in no cross-border skill transfer. It is, therefore, against the background expounded above that the objective of this paper is to provide a feasible framework for industrial technology acquisition, with experiences from successful countries. On the policy front, the study contributes to discussions on retooling industrial technology acquisition in Africa. The rest of the paper is restructured as follows: section 2 reviews the literature, while section 3 provides the feasible technology ac-

quisition strategy for Africa. Finally, section 4 concludes the paper.

Brief Review on Technology Acquisition

Technological transfer has been historical in the centre of industrial development. Resultantly, a number of researchers have proposed various technology transfer models. For instance, (Bar-Zakay, 1971) have proposed the Bar-Zaykay Model which stresses on the project management approach. That is, it emphasizes on the importance of process approach on planning and implementation of multinational projects. Although this model had proven to be effective in the 1970s, it was later criticized for its irrelevance on today's economic development structure, as its assumptions were based on the 1970s economic development dynamics. To build on the shortcomings of the Bar-Zakay model, the Behrman and Wallender (1976) Model argued that technology transfer is a seven-stage process, which includes amongst the other things, a careful decision on formulating the product design for which technology is to be transferred and improving that product using local skills. However, this model was also criticized for its inability to engage the transferee on its first three stages, thus underpinning dependency. (Ramanathan, 2011) has listed several other models of technological skill transfer, including the Dahlman and Westphal (1981) Model; The Schlie, Radnor, and Wad Model (1987) Model; and The Chantramonklasi Model to mention but few. Generally, these models were criticized for their segregation of transferees at some stage of the model, or their irrelevance in today's structure of the economy.

(Lin and Chang, 2009) therefore postulate that government should play a continuous proactive facilitating role to harmonize technology transfer. This includes facilitating research and development (R&D), seeking for mergers and acquisition (M&A) from abroad, collecting information about local conditions and making it available to potential foreign investors, as well as correcting domestic market failures. Oftentimes, without the facilitating role of the state, multinational enterprises are constraint by coordination problem.

Following the experiences from other countries, (Hoekman, Maskus and Saggi, 2005) show that at their development stage Japan, the Republic of Korea and Taiwan were very austere on any kind of FDI inflows, but more welcoming towards a more technology transfer kind of FDI inflow. Chinese policies, on the other hand, were inclined towards joint ventures than inward FDI. The other widely employed policies to acquiring technology include delivery of turnkey plants, international subcontracting, sale of patents rights, licences under patent protection, and contracts (Hoffmann, 1985).

Feasible Technology Acquisition Strategy for Africa

For industrialized economies, technology means innovation because such economies are already in the frontline of technology. In contrast, for African, technology means adopting the already existing technology from advanced economies, giving Africa a latecomer advantage. Nonetheless, for Africa to substantially acquire industrial technology, it needs leverage, which in this paper is defined as the right platform for Africa to renegotiate the terms of trade with advanced economies¹. Such a platform can be embodied within the African Continental Free Trade Area (ACFTA) initiative. The ACFTA initiative makes Africa the third-largest market after China and India by share of the world population, giving Africa an upper hand in trade negotiations. Central to these negotiations should be the explicit contracts that emphasise on industrial technology transfer. This should not be a problem because China through China-Africa balanced is already ensuring a minimum level of skills industrial skills transfer into recipient economies.

With the ACFTA, the other leverage for Africa is its comparative advantages to attract foreign investors. These comparative advantages include relatively cheap labor and relative resource abundance. Most of the inward foreign direct investment (FDI) in Africa is broadly speaking either market-oriented, cheap labour-oriented or natural resource-oriented. African industrial policymakers can utilize this leverage to identify key sectors to be industrialized and impose regulations that, while attracting FDI, carefully oblige multinational enterprises to transfer a certain minimum amount of industrial technology. (Branstetter, 2018) has highlighted that the same leverage has significantly contributed to the Chinese industrial policy that mandated foreign investors to transfer their technology as a condition to large market access in the Chinese economy. (Andrenelli and Gourdon, 2019) has also suggested linkage through which industrial skills can be transferred. This includes but not limited to research and development collaboration and setting up joint ventures, licensing, and equity investment.

Conclusion

The objective of this paper was to provide a feasible framework for industrial technology acquisition. Overall Africa, has several comparative advantages to acquire technology at a lower risk. These advantages include latecomer advantage and ACFTA that provide Africa with a better platform to renegotiate terms of trade with multinational enterprises. Therefore, the main conclusion is that if African industrial policymakers can carefully redesign industrial policies that are centric to technology, industrialization process is bound to speed up in the continent. However, it is crucial for policymakers that when making technology policies they strike for a balance between putting restrictive measures on in-

ward FDI and allowing technological transfers, as often technology comes from inward FDI.

References

- Alexander, O. (2013) 'The Place of Technical Education towards Skill Acquisition to National Development', *IOSR Journal of Research & Method in Education (IOSRJRME)*, 3(5), pp. 73–76. doi: 10.9790/7388-0357376.
- Andrenelli, A. and Gourdon, J. (2019) 'OECD Trade Policy Papers No .222 International Technology Transfer Policies Andrea Andrenelli , Julien Gourdon ', (January). doi: 10.1787/7103eabf-en.
- Bar-Zakay, S. N. (1971) 'Technology transfer model', *Technological Forecasting and Social Change*. doi: 10.1016/0040-1625(71)90009-6.
- Bolt, jutta, Timmer, M. P. and van Zanden, J. L. (2014) 'GDP per capita since 1820', *How Was Life?*, pp. 57–72. doi: 10.1787/9789264214262-7-en.
- Branstetter, L. (2018) 'China's "Forced" Technology Transfer Problem-And What to Do About It', *Peterson Institute for International Economics*, pp. 1–10. Available at: https://www.wto.org/english/thewto_e/acc_e/completeacc_e.htm.
- Demirova, S. (2018) 'Industrial Information Technology -a Revolutionary Factor in Logistics', (October).
- Garcia Calvo, A. (2014) 'Industrial Upgrading in Mixed Market Economies: The Spanish Case', *SSRN Electronic Journal*, (73). doi: 10.2139/ssrn.2411996.
- Hoekman, B. M., Maskus, K. E. and Saggi, K. (2005) 'Transfer of technology to developing countries: Unilateral and multilateral policy options', *World Development*, 33(10), pp. 1587–1602. doi: 10.1016/j.worlddev.2005.05.005.
- Joseph, E. B. et al. (2017) 'Industrial Attachment and Technical College Student Skills Acquisition for Sustainable Development in Akwa Ibom State , Nigeria', 8(2011), pp. 54–64.
- Lin, J. and Chang, H.-J. (2009) 'Introduction: growth and industrial upgrading', *Development Policy Review*.
- Lin, J. Y. (2011) 'New structural economics: A framework for rethinking development', *World Bank Research Observer*. doi: 10.1093/wbro/lkr007.

Mayer, J. (2002) 'Globalization, technology transfer and skill accumulation in low-income countries', (150). doi: 10.4324/9780203427637.ch5.

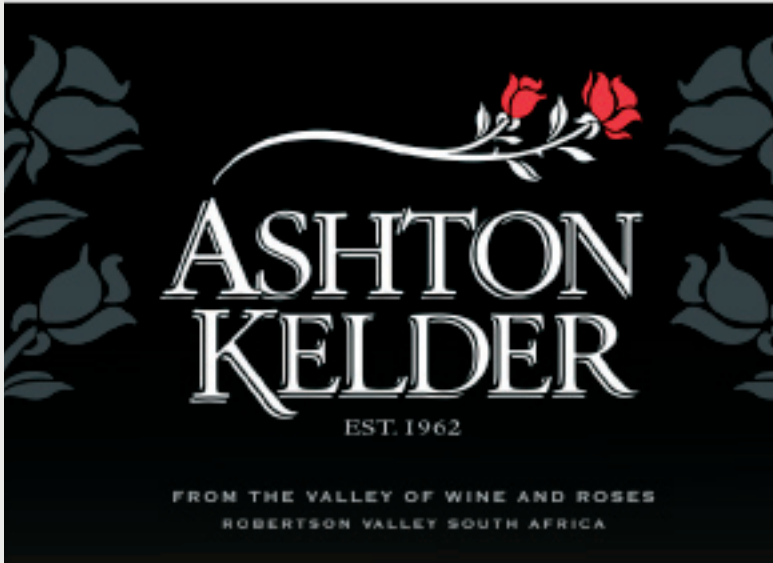
Ramanathan, K. (2011) 'An Overview of Technology Transfer and Technology Transfer Models', Chemistry, p. 28.

Thompson, L. (2019) 'Alternative South–South development collaboration? The role of China in the Coega Special Economic Zone in South Africa', Public Administration and Development, 39(4–5), pp. 193–202. doi: 10.1002/pad.1869.

Yao, D. (2013) 'Understanding Industrial Innovation and Upgrade from Modularization's Perspective', Journal of Knowledge Management, Economics and Information Technology, 3(6), pp. 1–10.

Footnotes

1. (Lin, 2011) has indicated that most of African countries have failed to industrialize because the policymakers adopted highly industrialized economies' policies that defy their own comparative advantages. Therefore, it is crucial that when choosing technology, it should be in line with African economies' comparative advantage.



FROM THE VALLEY OF WINE AND ROSES
ROBERTSON VALLEY SOUTH AFRICA



**VIP CLUB & PENSIONERS DAY
ACCOMMODATION**



CHESS - PICNICS - ACTIVITIES



**COME AND EXPERIENCE
ASHTON KELDER**



R62, ASHTON, 6715 T 023 615 1135
www.ashtonkelder.co.za