Aalborg Universitet

AALBORG UNIVERSITY

Special issue

Innovation research and economic development in Africa: Introduction

Adebowale, Boladale; Diyamett, Bitrina; Lema, Rasmus; Oyelaran-Oyeyinka, Banji

Published in:
African Journal of Science, Technology, Innovation and Development

DOI (link to publication from Publisher):
10.1080/20421338.2015.1010774

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Link to publication from Aalborg University

Citation for published version (APA):
Adebowale, B., Diyamett, B., Lema, R., & Oyelaran-Oyeyinka, B. (2014). Special issue: Innovation research and economic development in Africa: Introduction. *African Journal of Science, Technology, Innovation and Development*, *6*(5), v-xi. https://doi.org/10.1080/20421338.2015.1010774

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy
If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from vbn.aau.dk on: December 06, 2025

African Journal of Science, Technology, Innovation and Development, 2014
Vol. 6, No. 5, v–xi, http://dx.doi.org/10.1080/20421338.2015.1010774
© 2014 African Journal of Science, Technology, Innovation and Development

Routledge
Taylor & Francis Group

SPECIAL ISSUE: Innovation research and economic development in Africa

Introduction

Boladale Abiola Adebowale[a], Bitrina Diyamett[b], Rasmus Lema[c] and Oyebanji Oyelaran-Oyeyinka[d]

[a]*National Centre for Technology Management (NACETEM), Obafemi Awolowo University, Ile-Ife, Nigeria*
[b]*Science, Technology and Innovation Policy Research Organisation (STIPRO), Dares Salaam, Tanzania*
[c]*Department of Business and Management, Aalborg University, Aalborg, Denmark*
[d]*UN-HABITAT, Nairobi, Kenya and UNU-MERIT, Maastricht, The Netherlands*

The volume of the literature on innovation policy studies in Africa is in comparative regional perspective relatively low although the region embraced the idea of Science and Technology as a force for development over three decades ago.[2] Due in large part to the pre-existing weak scientific infrastructure in most African countries and in particular the poorer countries of Africa, the region's contribution has been limited in innovation studies so far (Lorentzen and Mohamed 2009).[3] However, as with other regions – at the academic, policy and political levels – African countries are increasingly adopting the 'systems approach' to innovation. This is reflected in the increasing attention in the scholarly debate over economic development in Africa (Muchie et al. 2003, Hounkonnou et al. 2012, Kingiri 2011, Oyelaran-Oyeyinka 2006, Oyelaran and McCormick 2007).[4] Over the last ten years, the systems approach has also received increasing attention from national policy makers in Africa as well as from donors and international organisations such as the OECD, the World Bank, UNCTAD and UNIDO. Many of these organisations fund activities aimed at supporting the promotion of innovation systems while there has also been scholarly collaboration in articulating continental STI programmes.[5]

A series of studies have pointed to a generally low prevalence of innovation and low R&D input in terms of human resources and expenditure in many parts of Africa (Adebowale 2012, Egbetokun et al. 2009). In many African countries there is a big gap between the generation of scientific capacities and the needs of the productive systems and society at large. This gap relates to the weak articulation of 'effective demand for knowledge' because of abject poverty. In many African countries the demand for skills is weak especially in the private sector, and the weak demand reflects in low rate of innovation (Diyamett and Musambya 2014). This situation requires governments' intervention in terms of policies, which in turn requires a better understanding of how the capacity to innovate can be stimulated.

This special issue brings together a number of articles that seek ultimately to contribute to this understanding. They both draw on and seek to contribute to a nascent research community around the African Journal of Science, Technology, Innovation and Development, which is focusing on innovation and competence-building systems (LICS) in Africa. This introductory article starts by setting out some of the most important topics, challenges and debates in the years ahead. It then explains the background for this special issue and shows how the articles in the volume bring the research agenda forward.

Challenges for research on innovation systems and development in Africa

Over the last ten years, the systems concept has become widely used in studies of learning and innovation in developing countries. One of the strengths of the early body of literature on national innovation systems in advanced economies was that the system's lens enabled it to understand variations across advanced economies such as Japan (Freeman, 1987), the United States (Mowery and Rosenberg, 1993) and Denmark (Lundvall, 1988). Comparative analytical work, comparing over time or in space, is especially important in innovation studies (Lundvall 2013, 21).

One of the key challenges of innovation systems research focus on developing countries is therefore to understand real differences, rather than benchmarking against an ideal type of innovation system (Egbetokun et al. 2009, Cozzens and Sutz 2014). Some of the ideas and concepts which have emerged in the innovation systems community have been derived mainly from specific experiences in rich countries and cannot be used as universal templates. While the systemic perspective and interactive learning is widely relevant, the agencies involved and the patterns of interaction will differ and there will be variations in the nature and degree of system external actors (Cassiolato et al. 2002)

In other words, researchers focusing on countries in Africa cannot uncritically adopt analytical frameworks of

innovation developed in the North. This is an analytical point in itself, but there are also normative reasons for avoiding uncritical transfer of concepts, although this is being recently addressed by scholars from the region and those working on the region (Oyelaran-Oyeyinka and Gehl Sampath 2010).[6] The scale of poverty as well as the relative importance of the informal sector with an infrequency of 'decent jobs' (ILO 2012) require that a more narrow focus on the relation between innovation and economic growth on one hand, and between productive development and competitiveness on the other, be combined with an understanding of the prerequisites for inclusive development (Johnson and Andersen 2012). Needless to say, in today's globalised economy, the challenges of inclusive development are numerous, as are the advantages associated with what seems to be a borderless transfer of knowledge. In addition, the innovation policy lens needs to focus on Africa's recent economic growth success, the impact of the rising consumer class and the potential impact of the resulting structural change driven by key sectors such as construction (notably with inflow of direct foreign investments from China) as well as the ICT and services sector broadly.

The state plays an important catalytic role in attenuating the binding constraints to technological learning so that the advantages of operating in a global market can be realised. This process involves explicit public policies especially those for industrial development, to support learning to take place both in firms and in the wider innovation context within the country. However, mere physical accumulation of technology as knowledge is evidently not sufficient. With the understanding that knowledge and technology are not linear, a newer paradigm for industrial development is required.

In emphasising that such a paradigm will involve a new role for the state in Africa, we keep a perspective that greater innovative intervention is required to channel capital and entrepreneurial energy to develop new industries (raise domestic production), reduce foreign consumption of rudimentary goods/services, and increase savings (Gerschenkron 1962). In other words, catch-up cannot be expected to occur through market forces left to themselves but requires active policies, state guidance and institution building – or, in other words, a developmental state that fosters the central role of learning. The state, thus defined, facilitates and champions the case of technological learning and mitigates the costs through both market and non-market interventions for the generation and knowledge and learning activities within low income countries. This special issue therefore explores the important role of policy and the state in theory and practice facilitating the economic and structural transformation of African latecomer countries into economic powers in their own right within the present global context. It argues that the market alone, as facilitated by the multilateral regime and the recurrent crises – food, environmental, fuel and economic – is insufficient to deal with the developmental issues faced by the low-income countries.

Innovation refers not only to technical innovations new to the world but also to the creation of new institutions that support competence-building and to incremental technical innovation in traditional sectors, including agriculture and related activities (Kraemer-Mbula and Wamae 2010, Johnson and Andersen 2012). In relation to poor countries, it is fundamental that innovation is understood in a broader socio-economic perspective with focus on competence building in all parts of the economy (Cozzens and Sutz 2012). In several countries in Africa the majority of the population operate within the informal sector. It is a major challenge for research to understand how the informal sector interacts with the formal sector and not least how it contributes to processes of learning and capacity building in society as a whole.

New concepts that have become increasingly used also signal new understandings of innovation and development. Recent work has suggested that there is a great potential for innovating for poor segments of the world population. Work on 'bottom of the pyramid innovation' has proposed that multinational firms addressing low income households in the South may do so with an attractive rate of return (Prahalad 2005). Work on 'below the radar innovation' (Clark and Chataway 2009, Wamae 2009) suggests that what is more significant from the point of view of indigenous development is that Southern firms may address the specific needs of poor regions and citizens in their home market that are neglected by foreign multinationals and use this as a stepping stone to build world class production capacity (Kaplinsky 2011).

There is also growing emphasis on inclusive development in donor and international organisations (The Growth Commission 2008) and on inclusive innovation systems in the research community (Altenburg 2009). This is in line with earlier research on development showing how offering training to farmers and workers stimulates the diffusion and efficient use of new technologies and how joint innovation enhances development processes at the grassroots level in the agricultural sector (Letty et al. 2012).

The last decade has been characterised by slow growth in the North and by rapid growth in the major emerging economies of China, India and Brazil (Kaplinsky et al. 2010). Recently, commodity exporting countries have benefitted from increased demand for raw materials and have as a result experienced high growth rates (Morris et al. 2012). There is growing global interdependence between China and the rest of the world including countries in Africa. China's economic growth, based upon export oriented manufacturing, results both in increased demand for raw materials and in tough competition when it comes to manufacturing activities.

The most recent developments in Africa with growing dependence of production of commodities and a tendency

toward deindustrialisation reflect the growing role of China and other major economies. It is a major task for governments in Africa to exploit the potential for a positive interaction with BRICS countries. This potential hints that emerging economies are in a particularly strong position to advance relevant and affordable technologies because conditions in BRICS are more similar to those in poor countries. To understand global dynamics and to adapt regional or national development strategies is crucial for African countries. A fundamental prerequisite for breaking out of vicious circles may be new forms of South–South interaction and negotiations. Innovation systems research in and on developing countries should therefore explore and compare the role of both South–South and North–South linkages in national systems (UNCTAD 2012, Lema et al. 2014). This will require, in turn, that researchers pay careful attention to the 'openness' of innovation systems in developing countries and combine the focus on local learning with global learning, including international technology collaboration (Lema and Lema 2012, UNCTAD 2012). Technologies for distance learning, increasing codification and reductions in telecommunication costs increase the importance of global linkages.

But even the most 'adequate' technologies developed abroad will need to go through a process of transformation in order to become both efficient and inclusive in the specific context of African countries. The fact that solutions may be adequate has little to do with the source of the technology but depends on the contextualisation and adaptation of the technology into the local context (Arocena and Sutz 2000). Building absorptive capacity in the informal sector and in agriculture requires new types of policy initiatives.

As already discussed, any research on innovation systems should pay careful attention to the particularities of different national systems and their context, not just in principle but in practice. This means that detailed empirical and comparative work is required and that researchers look beyond what is easily visible. The significant size and important role of the informal sector are particularly important in many African countries. A key task for LICs research is therefore to analyse how people work and learn in everyday activities in the formal and the informal sector. To understand innovation processes we need to understand 'learning systems' that encompass more than formal education and learning-by-doing taking place in the formal sector.

The weak articulation of 'effective demand for knowledge' remains a key challenge in most African countries. Education systems, including university education, foster new generations more successfully in operating in a context where innovation takes place. But in many African countries the demand for their skills is weak especially in the private sector and the weak demand reflects that the rate of innovation is low. There is a need to better understand how both the demand for knowledge and the capacity to innovate can be stimulated in the business sector. Understanding how links between knowledge producers and those who apply (or could apply) such knowledge in different sectors of society such as private enterprises, NGOs and other civic organisations is another major challenge for innovation research.

The complex challenges cannot be grasped without strengthening the political economy dimension of innovation systems research. There has been fairly limited research that asks how politics, power and interests influence technology and innovation policy and practice in Africa (Bell 2009). While the political economy dimension is widely relevant and underexplored in innovation studies, it is particularly relevant where 'new leaderships have largely tended to carve out renter opportunities and created increasingly monopolistic and autistic governance practices' (Karuri-Sebina et al. 2012, 492).

Measurement problems related to competence building and innovation are universal, but research in the African context will be faced with particular challenges of defining 'metrics'. There are specific measurement problems related to competence building and innovation for countries in Africa (Gault 2008). Can a more adequate, African-wide set of indicators be generated? How should we design indicators so that they make possible systematic assessment to estimate the contribution from public policy or donor contributions?

There are also questions about actors that are particular to African innovation systems. The increasing role of Chinese and Indian actors is likely to have an important influence on how learning and innovation unfolds, not least in a range of extractive and infrastructure industries in Africa (Kragelund and Hampwaye 2012). While the role of multinational corporations and global value chains is becoming more widespread in innovation systems research (Pietrobelli and Rabellotti 2009), there has not been a lot of work on overseas investments coming from China and India. The specific challenges and opportunities of such south-south linkages should be a key issue for new research. Do Chinese and Indian firms bring technologies and business models that are more relevant to African countries?

Similarly, little research has focused on the role of NGO and governmental donor assistance in promoting and shaping innovation activities and systems (Mouk 2014). This should be an important area for research on innovation systems in Africa, given the relatively high share of aid to GDP in many African countries and because aid represents quite a significant share of funds for research in the region. While relatively little aid has been specifically targeted at strengthening and reorienting innovation activities in the past (in the private sector and wider society), there is now a momentum for research created by the increasing attention of donor agencies to innovation issues.

The articles in this issue

Building capabilities and institutions that promote learning and innovation is a major challenge for countries in Africa. This requires research on science, technology and innovation where innovation is defined broadly and seen as co-evolving with the institutional setting. Innovation, to a large extent, is context-based, and to a large extent, studied in the context of more developed countries. Most existing concepts and theories have therefore been informed by empirical evidence from developed countries, and therefore cannot fruitfully be applied in the context of Africa, something that requires grounding innovation research in the African context (Muchie 2003).

This special issue seeks to mark the occasion of launching of the Africalics network which was set up to redress this imbalance. It consists of papers presented at the Globelics Seminar on Innovation and Economic Development held in March 2012.[7] The network was launched with the major aim to build capacity for innovation research in Africa. The papers advance the debates on innovation and competence building emphasised in the prior sections by combining conceptual discussions with insights from empirical studies from Algeria, Ghana, South Africa, Tanazania and Uganda.

The first sets of articles in the special issue, which are conceptual in nature, address innovation strategies for African countries at a rather aggregate level. The article by Banji Oyelaran-Oyeyinka examines the role of African states in the process of industrialization within a framework of state capacity, innovation policy and the dynamics of development. While industrial failure might be linked to a 'weak' state, the paper recognises the difficulty involved in the process of technological learning to industrialise in an environment of underdevelopment. Another important point raised in the paper is that commodity-driven growth is vulnerable to price volatility and could be suddenly arrested while unexpected external shocks may lead to reversals of long term gains in economic growth. The article explains that the African region has experienced significant economic growth in the last few years but much of it has developed around natural resources, including minerals and petroleum export. Although there is clear evidence that a good number of countries in Africa have grown based on factors other than commodity exports, yet inequality and poverty remain widespread. In addition, the author explains that while there has been much economic reasoning on growth and development that operates within a narrow understanding of knowledge and the economic processes, few attempts have been made to analyse the complex issues of knowledge within the developing economy context. The article argues that as governments are both the custodian of policies and institutions as well as the key actor that owns the means of enforcement, the role of the state will remain critical. State actions should therefore manifest in the capability to identify market failures and opportunities, and the ways in which policies, regulations and accompanying apparatus put in place for enforcement impact on agents' strategic technology choices thus steering economies in particular directions. In the main, this paper focuses on the importance of policies and as well the bureaucratic and political capacity of governments to affect such technology choices for development in latecomer countries. It provides evidence from emerging African countries that supports the view that state capacity is a capstone of sustainable development.

These conclusions are consistent with research on the 'developmental state' (Evans 1995). This concept was first widely explored in the context of innovation with the experiences of the new industrialised economies of East Asia, but has received a new impetus now with the catch-up of other countries such as China, India and Brazil. The lessons that can be learnt from the catch-up stories of Asian countries for Africa have been explored at length in some recent reviews (for example, Stiglitz et al. 2011). However much still needs to be done in the sense of applying these results to the African context. This is what the article by Padmashree Gehl Sampath seeks to do. What particularly stands out is that while there are newer constraints to learning, as imposed by the multilateral trading regime and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement), there are also newer opportunities, particularly through newer avenues, such as rising South–South relations. This article explores how the African developmental state can act as a champion of such opportunities for technological learning, and propose policy issues and options at length. The article by Michael Kahn connects the debate development state with the politico-economic implications of the BRICS vis-à-vis Africa. He discusses the phenomenon of resource nationalism in the context of the developmental state and connects the current challenges of African innovation systems.

Bengt-Åke Lundvall and Rasmus Lema provide an analysis of policy options for African countries seeking innovation and learning based development strategies. What kind of policies and institutions are necessary in order to transform the current increase in rents from commodities exports into industrial investment and upgrading of agriculture and agro-industrial development? This issue is addressed the context of competing theories about economic development. They propose that 'learning' is at the core of any process of development. Development is a process where individuals and organisations learn to do new things and learn to do them in new ways in conjunction with structural transformation. At the core of the process of development is competence building. The authors emphasise that there are major differences between African countries and that there is not one strategy that fits all and that the relevance of policy options need to be assessed on a case-by-case basis and the specific strategies need to be built on the basis of local

experience. The remainder of the papers in the special issue draw on insights from particular issues.

The article by Francis Bartels and Ritin Koria addresses the challenges of research-based policy analysis involving mapping, measuring and monitoring the innovation system. The authors draw on a study of the Ghanaian innovation system and their article presents an analysis of interactions of the NSI in terms of cross tabulations and factor analysis. Indications of the type of policy implications leading to policy recommendations are provided and discussed.

The article by Abdelkader Djeflat and Yevgeny Kusnetsov reviews North African experiences It addresses the fundamental issue of innovation 'emergence' in late industrialising countries such as the North African countries, both in terms of policies and conceptual framework. It focuses on role models of modern innovation based development and public interventions to diffuse and scale up these role models. It discusses the so-called bridge institutions of innovation, which transform skills into knowledge valued by markets. It shows how these institutions (science and technology parks, international universities and skilled diaspora networks) promote innovation and create high productivity employment. Policy to promote innovation is therefore designed as a process with endogenous dynamics, where one step follows the other and evolves in three time horizons: immediate (entry points), medium-term (the critical mass effect) and long-term (major structural reforms). Case studies from North African countries indicate that entry points are numerous and more common than originally expected and that key issues are mostly linked to building critical mass in the medium term, and achieving structural reforms and cultural change in the long term.

The insights are consistent with those of Julius Ecuru, Peter Lating, Yasin Ziraba and Lena Trojer for the case of manufacturing in Uganda. They show that Ugandan manufacturing firms, especially in the subsectors of foods and beverages, chemicals and pharmaceutics, can be more innovative if they have access to scientific and technical resources from local universities and research organisations. It has been demonstrated elsewhere that growth of firms can be enhanced where university, industry and government interrelationships are strong. They also show, however, that fear of competition and lack of trust appeared to be the key barriers to firms' interaction with other firms and organisations. However, seminars and conferences, business associations, inter-firm visits, and joint programmes seemed to be the preferred means to foster interactions and collaborations.

The paper by Bitrina Diyamett and Musambya Mutambala shifts the attention from local to global linkages for the case of Tanzania. Over the past years, Tanzania has been witnessing an increased inflow of FDI, but very little could be said on their impact on local technological capability building. This article is a modest attempt to close this knowledge gap. The study investigates FDI in manufacturing, mining and farming, employing both survey and case studies research methods. The authors conclude that to address these challenges of knowledge gap, and promote local technological capabilities through FDI, the government should put in place infrastructure and institutions that are friendly to production climate that attract efficiency-seeking FDI; forge linkages between FDI and local firms through the policy of minimum local content, and harmonise socio-economic relationship between foreign investors and citizens surrounding FDI firms.

Whilst the supply of knowledge and competent people slowly has been growing, the continued lack of demand is still a forgotten side of the knowledge problem. This is the key message in the paper by Tomas Kjellqvist, Birgitta Rydhagen and Lena Trojer. The lack of demand for knowledge in developing countries could be addressed by promoting emerging innovations systems. Increasing the collaboration between academic partners, governmental authorities and the private, industrial sector has proved to be a success factor for innovation linked to economic growth in industrialised as well as newly industrialised countries and in emerging economies. However, it is not evident that such success stories of improved global competitiveness would be directly replicable to the poorest countries. The article explores an alternative route for emerging innovation systems in poor countries. The authors suggest innovation for social inclusion rather than for global competitiveness. Such a route entails a slightly different conceptualisation of the innovation systems approach where innovation takes into account producers' knowledge and capacity in processes of coopetition to cater for both users' and producers' needs on micro level. They provided practical experiences in Uganda and Tanzania that illuminate possibilities and challenges in the process of developing inclusive innovations.

Notes

1 The guest editors are members of the AfricaLics Scientific Board. Authors listed alphabetically. We are grateful to the editors of AJSTID and Jane Buffham at Taylor & Francis.

2 For instance two sub-regional Networks namely: East African Technology Studies Network and the West African Technology Studies Network started in 1982 and were finally merged into the African Technology Policy Studies (ATPS) Network in 1994. These Networks which were funded and supported by the IDRC, the Rockefeller Foundation, SIDA, and The Carnegie Corporation of New York, among others, produced a wide variety of case studies across several sectors and countries. While many of the studies impacted on policy in their respective countries, a large portion did not manage to be published in academic journals. An early book edited by Banji Oyeyinka, Osita Ogbu and Hasa Mlawa IDRC (1994) summarized some of the case studies and issues

3 Between 1997 and 2008 some major journals in the field of innovation published 849 articles on innovation, of which only 37 or 4% were on Least Developed Countries (LDCs),

including countries of Africa. In addition, these articles were authored largely from individuals outside the LDCs. In fact, 57% of single authored papers and more than 70% of the multiple authored papers originated from more developed countries.

4 Very early on at the political level The Lagos Plan of Action (officially the Lagos Plan of Action for the Economic Development of Africa, 1980–2000), now followed by NEPAD was an Organization of African Unity-backed plan to increase Africa's self-sufficiency. It was drafted in Lagos, Nigeria in April 1980, during a conference which included a variety of African leaders. It has been characterized as the collective response of African states to the World Bank's 1981 Berg report with strong emphasis on S&T. The most serious challenges to the development of science and technology aspirations in Africa had been poor and unsteady funding, brain drain (flight of skilled personnel to other areas), inadequate infrastructure, insufficient levels of literacy and a shortage of skills (men and women) in science research and STI policy studies.

5 For example the new NEPAD STI Agenda which was adopted by the African Council of STI ministers was drafted in collaboration with scholars from UNU-INTECH and the NEPAD secretariat.in the early 2000.

6 Latecomer Development: Innovation and Knowledge for Economic Growth, Routledge

7 The African Network for Economics of Learning, Innovation and Competence Building (Africalics) was formed to create a stronger local research community on innovation and development in Africa and to share experiences with communities in other parts of the world through the Globelics network. It was founded during the Innovation and development workshop that took place in March 2012 in Dar es Salaam, Tanzania. This special issue provides papers from the inaugural workshop. The workshop was co-organized by the Globelics Secretariat and the Science, Technology and Innovation Policy Research organization (STIPRO), a Tanzanian independent think tank. Papers and presentations from the workshop may be downloaded at http://www.stipro.or.tz. Further details about AfricaLics may be found at http://www.africalics.org/.

References

Adebowale, B.O.A. (2012), Innovation policies institutions and performance: Why Malaysia overtook Nigeria in the oil palm industry. *International Journal of Technological Learning, Innovation and Development* 5(1/2): 126–157.

Altenburg, Tilman 2009. Building inclusive innovation systems in developing countries: challenges for is research. In: Lundvall, B-Å, Joseph, K J, Chaminade, C. and Vang, J. (eds.), *Handbook on innovation systems and developing countries: building domestic capabilities in a global context.* Cheltenham: Edward Elgar.

Arocena, R. and Sutz, J. (2000), Looking at national systems of innovation from the South. *Industry and Innovation* 7(1): 55-75.

Bell, M. (2009) Innovation capabilities and directions of development. STEPS Working Paper. Brighton: STEPS Centre.

Cassiolato, J. E., Szapiro, M.H.S. and Lastres H.M.M. (2002), Local system of innovation under strain: the impacts of structural change in the telecommunications cluster of Campinas, Brazil. *International Journal of Technology Management* 24(7/8): 680-704.

Clark, N. & Chataway, J. (2009). Below the radar: a fresh approach to innovation and development policy. *International Journal of Technology Management & Sustainable Development* 8(3): 171–175.

Cozzens, S. & Sutz, J. (2012). Innovation in informal settings: a research agenda. unpublished manuscript.

Cozzens, S. & Sutz, J. (2014). Innovation in informal settings: reflections and proposals for a research agenda. *Innovation and Development* 4(1): 5–31.

Diyamett, B. & Musambya, M. (2014), Is the current booming growth in Africa Worth Celebrating? Some evidence from Tanzania. Southern voice on post-MDG international development goals. Occasional Paper Series 9.

Egbetokun, A.A., Siyanbola, W.O., Sanni, M., Olamade, O.O., Adeniyi, A.A. & Irefin, I.A. (2009), What drives innovation? Inferences from an industry-wide survey in Nigeria. *International Journal of Technology Management* 45(1): 123–140.

Freeman, C. (1987), *Technology policy and economic performance: lessons from Japan,* London, Pinter.

Gault, F. (2008), Science, technology and innovation indicators: opportunities for Africa. *African Statistical Journal* 6: 141–162.

Gerschenkron, A. (1962 [1963]), *Economic backwardness in historical perspective. A book of essays*, Cambridge, MA: Belknap Press of Harvard University Press.

Hounkonnou, D., Kossou, D., Kuyper, T.W., Leeuwis, C., Nederlof, E. S. Roling, N. . . . Van Huis, A. (2012), An innovation systems approach to institutional change: smallholder development in West Africa. *Agricultural Systems* 108. : 74–83.

Johnson, B. & Andersen, A.D. (2012), *Learning, innovation and inclusive development: new perspectives on economic development strategy and development aid.* Aalborg: Aalborg Universitetsforlag.

Kaplinsky, R. 2011. Schumacher meets Schumpeter: appropriate technology below the radar. *Research Policy* 40(2): 193–203.

Kaplinsky, R., Terheggen, A., Tijaja J. & Farooki M. (2010), What happens in global value chains when the market shifts from the North to the South? Washington, DC: World Bank.

Karuri-Sebina, G., Sall, A. Maharajh, R. & Segobye, A. (2012), Fictions, Factors and futures: reflections on Africa's `impressive growth. *Development* 55(4: 491-496.

Kingiri, A.N. (2011), Conflicting advocacy coalitions in an evolving modern biotechnology regulatory subsystem: policy learning and influencing Kenya's regulatory policy process. *Science and Public Policy* 38(3): 199–211.

Kraemer-Mbula, E. & Wamae, W. (eds.) (2010), *Innovation and the development agenda.* Toronto: OECD Publishing and International Development Research Centre (IDRC).

Kragelund, P. & Hampwaye, G. (2012), Seeking markets and resources: state-driven Chinese and Indian investments in Zambia. *International Journal of Technology and Globalisation* 6(4): 352–368.

Lema, R., Johnson, B. Andersen, A.D., Lundvall, B.-Å. & Chaudhary, A. (2014), *Low-Carbon innovation and development. Globelics thematic review.* Aalborg: Aalborg University Press.

Lema, R. & Lema, A. (2012), Technology transfer? The rise of China and India in green technology sectors. *Innovation and Development* 2(1): 23–44.

Letty, B., Shezi, Z. & Mudhara, M. (2012). An exploration of agricultural grassroots innovation in South Africa and implications for innovation indicator development. Working Paper. Washington, DC. UNU.

Lorentzen, J. & Mohamed, R. (2009). '…to each according to his (her) needs': where are the poor in innovation studies? 7th Annual Globelics Conference. 6-9 October 2009, Dakar, Senegal.

Lundvall, B.-Å. (1988). Innovation as an interactive process – from user-producer interaction to national systems of innovation. In: Dosi, G., Freeman, C., Nelson, R. R., Silverberg, G. & Soete, L. (eds.) *Technology and economy theory*. London: Pinter.

Morris, M., Kaplinsky, R. & Kaplan, D. (2012), 'One thing leads to another'. Commodities, linkages and industrial development. *Resources Policy* 37(4): 408–416.

Mowery, D.C. & Rosenberg, N, (1993), The US innovation system. In: Nelson, R.R. (ed.) *National innovation systems: a comparative analysis*. New York: Oxford University Press.

Muchie, M. (2003), Re-thinking Africa's development through the national innovation system. In:. Muchie, M. Gammeltoft, P. & Lundvall, B.-Å. (eds.), *Putting Africa first. The making of African innovation systems,* Aalborg: Aalborg University Press.

Muchie, M. Gammeltoft, P. & Lundvall, B.-Å. (eds.), *Putting Africa first. The making of African innovation systems,* Aalborg: Aalborg University Press.

Oyelaran-Oyeyinka, B. (2006), Systems of innovation and underdevelopment: an institutional perspective. *Science Technology & Society* 11(2): 239–269.

Oyelaran-Oyeyinka, B. & Mccormick, D. (2007), *Industrial clusters and innovation systems in Africa,* New York, United Nations University Press.

Oyelaran-Oyeyinka, B. & Gehl-Sampath, P. (2010), *Latecomer development, innovation and knowledge for economic growth*. London: Routledge.

Pietrobelli, C. & Rabellotti, R. (2009), The global dimension of innovation system thinking In: Lundvall, B-Å, Joseph, K J, Chaminade, C. and Vang, J. (eds.), *Handbook on innovation systems and developing countries: building domestic capabilities in a global context.* Cheltenham: Edward Elgar.

Prahalad, C.K. (2005), *The fortune at the bottom of the pyramid,* Upper Saddle River, NJ: Wharton School Publishing.

The Growth Commission (2008), *the growth report: strategies for sustained growth and inclusive development*. Washington, DC.: World Bank Publications.

UNCTAD (2012), Innovation, Technology and South-South Collaboration. *Technology and innovation report*. New York: United Nations Conference on Trade and Development, United Nations.

Wamae, W. (2009). Enhancing the role of knowledge and innovation for development. *International Journal of Technology Management & Sustainable Development* 8(3): 199–220.