

Innovation Policy And Governance In The African Region

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ABSTRACT

This paper undertakes a desktop examination of innovation policy and governance in Africa. The article therefore adds on to the importance of intra-African region innovation policy dialogue by exploring policy developments in the African region. The article identifies a weak and fragmented innovation system as a major challenge facing many of the African countries, exacerbated by the lack of an explicit innovation strategy.

The literature indicates that Science, Technology and Innovation (STI) policies should not simply adopt a science-push approach to innovation, but rather focus on building an entire system of innovation. The emergence of a knowledge-based economy and globalisation such as the BRICs - Brazil, Russia, India, China and South Africa are restructuring the dynamics of innovation in developing countries. The literature has also shown that several international organisations have played significant roles in the development of Science and Technology (S&T) policies among African countries. However, the international organisations initiatives have mostly focused on the development of S&T with minimal emphasis on the role of policies and administration, which would increase learning and innovation performance in Africa. The central premise of the article is that innovation policy and governance is an essential component of the National System of Innovation in the African region.

Keywords: Innovation Policy; Governance; National System of Innovation; Science, Technology and Innovation

INTRODUCTION

This paper undertakes a desktop examination of innovation policy and governance in Africa. One of the fundamental problems facing many countries in the African continent can be attributed to the lack of having an explicit innovation strategy in place. The available National System of Innovation (NSI)-related policies are inconsistent and disconnected. The informal sector represents three-quarter of non-agricultural employment and over 40% of the gross national product (GNP) of many African countries. Yet, the policies in place disregarding the role of the informal sector and traditional sectors are absent, asymmetrical or ineffective.

Therefore this paper supports the view by Metcalfe and Ramlogan (2006:375) that building an effective innovation policy and effective governance in the African region for identifying bottlenecks and ‘abnormalities’, improving knowledge flows and strengthening linkages within and across the systems are essential.

The African STI Indicators (ASTII) initiative by African Union AU–New Partnership for Africa’s Development, AU–NEPAD (2010: xvii) states that “Africa needs STI indicators to measure the significance of STI in its development.” The ASTII initiative addresses the lack of evidence-based policy processes and better understanding of, and improvement in the state of STI in the African region (AU-NEPAD, 2010: xviii).

Evaluations of innovation policies are few and far between, therefore deeper tests of strength are absent. To contribute to development efforts will require adapting the innovation policy framework to reflect the realities of the Africa region (Stein, 1992; Lall & Teubal, 1998; Johnson, Edquist & Lundvall 2003; Edquist, 2010). According to Marcelle (2011:4), “the biggest challenges facing countries in the developing world include poor health services, lack of affordable housing, environmental sustainability, energy, poverty, urban management, and a range of other issues that affect quality of life.”

‘Wicked challenges’ with a ‘Wicked character’, which require the implementation of tailored appropriate policy mixes along the continuum between, for example, strict non-intervention and provision of preferential treatment for pre-selected supported innovation policies and strategies periodically. The challenges are ‘wicked’ because of lack of clarity on what the relevant causes are, what the possible effect of possible strategies are and what criteria should be used to assess the wanted and unwanted effects Bekkers, Edelenbos and Steijn (2011:212). In Rittel and Webber’s (1984) terminology, many of societies’ problems are no longer “tame” to be solved by hierarchical or technocratic models of leadership, management or knowledge creation. The ‘wicked’ problem as stated by Grint (2010:14) and Goodwin (2011:60) “cannot simply be removed from its environment, solved and returned without affecting the environment. Moreover, there is no clear relationship between cause and effect.” Even though the ‘wicked challenges’ or ‘national crisis’, cannot be resolved in a short period, this paper is driven by the idea that the wicked problems actively require new approaches through collaborative processes.

Correcting market limitations such as problems of appropriability of innovations, weakness and failures in financial and labour markets, poor technology infrastructure, dysfunctional education and training systems, inadequate intellectual property (IP) rights regimes and regulatory systems, and poor support for investment in innovation that characterise many developing countries often requires direct interventions (Lall & Teubal, 1998; Lall & Petrobelli, 2002).

This article has observed that studies in innovation policy and NSI in developing countries is at a preliminary stage. Manzini (2012:1) states that “the NSI approach towards understanding how technological innovation operates within national economic systems is relatively new. There is, therefore, a need to develop theoretical tools to sharpen... understanding of this conceptual framework.”

The ‘wicked’ challenges are some of the issues that affect the development of public administration and policy in the Africa region. Access to the basic necessities (food, potable water, housing, fuel and energy) is highly restricted in Africa. Life expectancy in the region declined from 49 years in 1999 to 46 years in 2001 owing largely to the impact of HIV/AIDS, malaria and tuberculosis (United Nations, 2005:4-5). However, life expectancy in Africa was projected to rise to 51.3 years by the end of 2010 and to reach 69.5 years by 2045. Among the plausible explanations for the lackluster performance of the developing regions’ human development front are weaknesses in governance and policy administration, failure to reflect poverty concerns in budget allocations and the exclusion of the poor from decision-making (Economic and Social Commission for Western Asia, 2004). To surmount the ‘wicked’ challenges within the Africa region will require promoting policies for development through research within the NSIs.

LITERATURE REVIEW

Having introduced the thrust of the article, the next section provides a literature review of the innovation policy in African region and related theories.

Innovation Policy in the African Region

From this research perspective, innovation policy refers to “a set of public measures to increase... innovations, to improve the conditions for then uptake of innovations and/or to improve the articulation of... [innovation] in order to spur innovations and the diffusion of innovations.” Innovation policy is also about market creation, as governments can play a role by actively supporting breakthroughs (basic research, product standards, public procurement) (Lafferty, Ruud & Larsen, 2005:263). For the purpose of this research, innovation policy has been defined according to the Veugelers, Tanayama & Toivanen (2009:13) “as a set of actions by public organisations that influence the development and diffusion of innovations.” The innovation policy agenda requires a broader, cross-ministerial attention, greater interrelatedness of innovation systems and innovation policy is no longer simply the purview of Science and Technology (S&T) institutions (OECD, 2005:17). The challenge is to provide scientific advice for evidence-based policy making at different levels and to ensure that this advice is contributing to the emergence of a common understanding of African-wide challenges and opportunities.

The African region continues to consider the regional approach as the best tool for development. Some of the regional initiatives in Africa, for example, Common Market for Eastern and Southern Africa (COMESA), Economic

Community of West African States (ECOWAS) and Southern African Development Community (SADC) have neither delivered much to uplift the economic conditions of member countries nor ensured sustainable growth and liberalisation (UNCTAD, 2015:9-17). However, the issue at hand is not whether Africa should integrate or not; there is a political consensus for regional integration in Africa. The issue is how innovation policy can maximise the benefits of African regional integration.

Policy integration problems are problems of coordination in the governance structure that reveal systemic failures (Lafferty et al., 2005:255).

Several international organisations have played significant roles in the development of S&T and innovation policies among African countries, including UNESCO, UNCTAD, IDRC, and the Swedish Agency for Research Co-operation with Developing Countries (SAREC). However, scholars such as Lundvall, Interakummerd and Vang (2006), Srinivas and Sutz (2008) and Juma and Yee-Cheong (2005) have criticised the multilateral institutions' interventions and harmonisation activities that have resulted in the lack of consistency with the overall developing economies institutional frameworks.

Edquist (2010:17) observed that innovation policy objectives are formulated in a political process. A number of priorities in public administration reform in Africa include promoting democratisation and decentralisation; developing legal and institutional frameworks and economic governance systems; implementing ethics and anti-corruption strategies; improving resource mobilisation and financial management systems; and tapping the potential of e-government (United Nations, 2005:12).

Clapham (2001:66-68); Herbst (2000:11) OECD (2016) are pessimistic of an effective innovation policy in the African continent owing to many African countries being led by former liberation movements or authoritarian, single-party governments.

Governance within the African Region

Pierre and Peters (2006:24) note that “governance can be composed of four types of procedures; objective setting, decision-making, coherence and steering.” “Governance is about the handling of complexity and the management of dynamic flows. It is fundamentally about interdependence, linkages, networks, partnerships, co-evolution and mutual adjustment” (Mothe, 2001:21). This research adopts the definition of governance according to the World Bank Worldwide Governance Indicators Framework WGI (2013:1):

“Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.”

Governance has also been viewed in literature as an alternative from the traditional hierarchical government to a horizontal network relationship and interactions that shape decision-making (Kohler-Koch & Eisling, 1999; Pierre & Peters, 2005; Lundqvist, 2001:231; Hillman, Nilsson, Rickne & Magnusson, 2011:403; OECD, 2016:4). In this context, the traditional government mechanisms are not excluded because, in principle there are reasons to blend into ‘hybrid arrangements’ (Hey, Jacob & Volkery, 2007) in shaping innovation policy.

The concept of governance is pluricentric rather than adherence to unicentric systems, which has been used in this context to refer to the actions of a wide variety of public, private and semi-public actors (Kemp, Parto & Gibson, 2005:26; Bekkers et al., 2011:8).

The processes of governing involves negotiation, concentration and cooperation rather than coercion, command and control (Van Kersbergen & Van Waarden, 2004:152; Bekkers et al. 2011:11). For instance, negotiation is a field of knowledge and endeavour that focuses on gaining the favour of people from whom we want things (Cohen, 1980:5; Meredith & Mantel, 2010:164).

Mkandawire (2001) argues that the trouble with the good governance paradigm is that it comes embedded in neo-liberal policy of which African state capacities have been stripped. Leading to what Chabal and Daloz (1999:142) term as “...unrealistic expectations in terms of the development potential of a modern independent Africa.” A paradigm in this research context is about the logic, the values, the principles, and the general path of movement, a theoretical structure of experience whose practical operation varies depending on the historical circumstances of each country (Ake, 2001: 124). NEPAD has set out a “Consolidated S&T Plan of Action” (African Union–New Partnership for Africa’s Development, AU–NEPAD, 2010). The plan seeks to improve the quality of STI policies of African countries through processes that promote sharing of experiences and policy learning (Kahn, 2008:164; AU-NEPAD, 2010) and rests on four pillars - capacity building, knowledge production, technology and innovation.

Governance Theories

A number of different theoretical frameworks have evolved that can be used to explain and analyse governance and the government. These frameworks can be borrowed from different disciplines with different perspectives and terminologies. The agency theory paradigm arises from the field of finance and economics, transaction theory arises from economics and organisational theory, while stakeholder theory and steward theory arise from a more social-oriented perspective on corporate governance (Solomon & Solomon, 2008:36; Ketokivi & Mahoney, 2016). The aforementioned three theories support the need for stricter governance principles and the frameworks generally overlap theoretically.

The Agency Theory

The agency theory views the government as the agent and the other network actors as the principal within the NSI. Archer (1995:246) argues that “...neither the structuring of society, nor the social interaction responsible for it can be discussed in isolation from one another.” Archer (1995:247) therefore, proposes a ‘double morphogenesis’ that involves both the re-structuring (change processes) and the agency. In this research context, examining the interplay between the NSI governance structure and agency theory will provide an in-depth research comprehension. Principal agent theory with the implications of agency problems underscores the bedrock of analyses that can be generated in regard to contractual arrangement (Gutiérrez, 2012:160; Roach, 2015:2)

The agency theory is mainly concerned with resolving two problems that can occur between the agent and the other actors’ relationship. The first problem arises when the objectives of the principal and agent conflict and it is difficult or expensive for the principal to verify the agent’s behaviour. The second problem is the risk-sharing problem that arises when the principal and the agent may prefer different actions because of different risk preferences (Luo, 2008:2-3). The principals are therefore worried about agents’ opportunism and self-seeking with guile. The agent is likely to display a tendency towards ‘egoism’ that is, behaviour that leads to maximising one’s own perceived self-interest (Boatright, 1999). As a result, it is important that the NSI actors ‘monitor’ the government policies and help to resolve agency conflicts. Overall, a well-designed governance system is necessary to the point that the system effectively guides and monitors the government behaviours while not hindering government’s flexibility and aspiration to make decisions that are in the best interest of the NSI system. Put simply Luo (2008:3-4) states that the agents should avoid a situation of ‘the best-governed and worst-managed’.

The Stewardship Theory

The stewardship has been supported by agency theory critics, who contend that the theory is based on a false premise on the nature of man. The stewardship theory holds that there is no conflict of interest between steward and principals (Davis, Schoorman, & Donaldson, 1997; Ketokivi & Mahoney, 2016). The steward seeks to attain the objectives of the institution. Therefore, even where the interests of the steward and the principal are not aligned, the steward places higher value on cooperation than defection (terms found in game theory). In this research context, the stewardship theory focus on governance structures that facilitate and empower the NSI stewards rather than the use of monitoring and controlling tools. However, Solomon & Solomon (2008:34) state that “implementing stewardship governance mechanisms for an agent would be analogous to turning the hen house over to the fox.” As a result, agency prescriptions can be viewed as the necessary costs of insuring principal utility against the risks of the government opportunism.

The Stakeholder Theory

The stakeholder theory has developed gradually since the 1970, with a historical lineage, practical applications and intellectual appeal more substantial than agency theory, and yet has had much less impact on governance policy (Donaldson & Preston, 1995:65; Ketokivi & Mahoney, 2016; Roach, 2015). The stakeholder theory defines organisations as multilateral agreements between the enterprise and its multiple stakeholders (Freeman, 2004; Clarke, 2004; Roach, 2015)). Stakeholder theory provides an appropriate lens for considering a more complex perspective of the value that stakeholders seek as well as new ways to measure it (Harrison & Wicks, 2013:1) The stakeholder approach focuses on the ‘entire network of formal and informal relations that determine how control is exercised within the NSI.

Wijnberg (2000:332) makes a number of stakeholder theory recommendations, which when applied in this research will require, firstly, that the NSI structure to permit sufficient autonomy for the research institutes to confront ethical dilemmas. Second, the codes of conduct or mission statements should be fruitfully used to enforce or encourage virtuous decision-making.

Pieterse (2010:11) points out that different stakeholder have different takes on the meaning of and how to achieve (sustainable) development. Gray, Owen and Adams (1996:45) view a stakeholder as any group or individual that can be influenced by, or can itself influence, the activities of the organisation. Starik (1994) offers a narrow definition of stakeholders as "individuals or groups with which the ‘government’ interacts who have a 'stake', or vested interest..." on the broadest end of the spectrum, Starik (1994:94) further suggests that the stakeholder is “any naturally occurring entity which affects or is affected by ‘the institutions’ performance.” Stakeholders’ definitions may be distinguished as illustrated in Figure 1 along the strategic, versus a normative dimension.

Figure 1. Strategic and normative dimensions of stakeholder definitions Source: adopted from Friedman and Miles (2006:12)

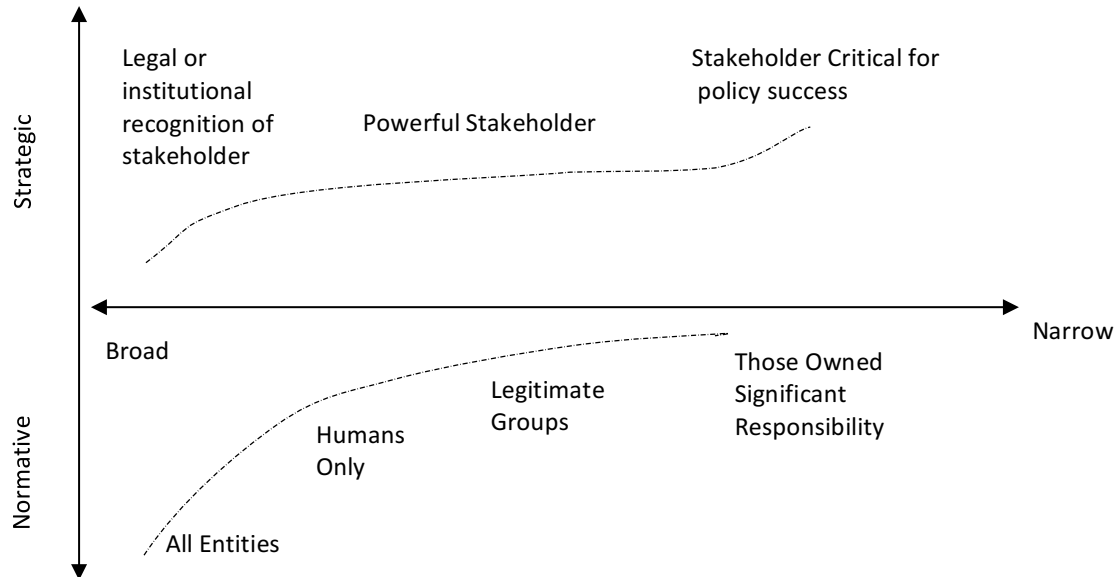


Figure 1 illustrates that strategic dimension fall under a continuum that has varying degrees of impact on the existence of the institution, while along the normative dimension are definitions of stakeholders that differ in scope to reflect societal norms. Normative refers to the way people live in an ideal 'good' society; and what people ought to do, in order to achieve a ‘good’ society or any notion of the 'good' (Friedman & Miles, 2006:34). In the part, norms created in the life-world and brought into the professional atmosphere play a crucial role (Wickenberg, 2006:114). Given the number of contractual relations that exist among the NSI actors, both explicit and implicit, Dunn (1996:144) proposes

that ‘institutions’ should care enough for the least advantaged stakeholders not to be harmed and privilege those stakeholders with whom the ‘institutions’ have a close relationship.

Carroll (2004:115-117) suggests that stakeholder identification and analysis should be approached by finding answers to questions such as: Who are the stakeholders? What are their interests or claims? What opportunities and threats do they present? What responsibility does the corporation have to each group, whether economic, legal, ethical or philanthropic? What strategy is best designed to accommodate or cope with these challenges or opportunities? What response should be made: accommodating, negotiating, manipulating, resistance or a combination? (Carroll, 2004).

Value can be created, traded, and sustained because stakeholders can jointly satisfy their needs and desires by making voluntary agreements with each other that for the most part are kept (Ketokivi & Mahoney, 2016:132). The NSI actors include the government and the public authorities. Sometimes trade unions play a marginal role in the NSI. Both the academic and the business sector can have an *ex officio* presence in all the NSI matters.

AFRICAN REGION RESEARCH AND KNOWLEDGE SYSTEMS

This sub-section examines the main features and performance of the African region’s NSI. This sub-section also represents the African regional perspective on research and knowledge management system. Historical perspectives to innovation and industrial development indicate that during the 1970s many African countries established national research councils and R&D centres. The innovation and industrial development was partly driven by the Conference of Cabinet Ministers responsible for the Application of Science and Technology (CASTAFRICA I) held in Dakar, Senegal, in January 1974. The number of African countries with S&T promotion bodies increased from 4 to 28 between 1974 and 1987. Also, several R&D institutions specialising in natural sciences, agricultural, medical, nuclear, industrial and environmental research increased rapidly on the region.

Policies relating to STI in many African governments have been encouraged by NEPAD, many of which has adopted a science-push. The UNCTAD (2015:82) notes that STI policies should not simply adopt a science-push approach to innovation, but rather focus on building an entire NSI. A weak and fragmented NSI in developing countries is a major challenge as observed by Knutsen (2004:16-17). Therefore, it may be argued that integration is paramount for addressing the problem of fragmented African NSIs. The next section reviews research and knowledge systems within the African region.

The Higher Education Institutions (HEIs) fulfil a crucial role in respect of the resolution of the complex ‘wicked’ challenges that face the African region. The emergence of a knowledge-based economy and globalisation, for example the BRICs- Brazil, Russia, India, China and South Africa, are restructuring the dynamics of innovation in developing countries, which targets low-income earners previously not considered. Knowledge diffusion in developing economies is an essential aspect of innovation, which involves international knowledge spill overs, foreign Research and Development (R&D) stocks with bilateral import shares, the purchase of capital goods and services, sources such as scientific publications, attendance at trade fairs, and the acquisition of tacit knowledge through collaboration (OECD/Eurostat 2005:84; Kokko, 2010:115), imports from R&D-intensive countries prompting reverse engineering (Mansfield, Schwartz & Wagner, 1981; Zander, 1991). However, South African Department of Science and Technology (SA DST) Ministerial Review Committee, (2012:83) notes that the ways in which knowledge diffusion and spill-overs have operated historically, and now, are still unknown. The public sector science will continue to play leading roles in developing new knowledge and skills for nurturing these technological advances and supporting their exploitation in the wider economy. But it will also undergo its own transformation (OECD, 2016).

The ultimate aim of the Indigenous knowledge systems (IKS) instrument is to contribute to sustainable economic development of not only South Africa, but the African region as a whole (National Research Foundation(NRF) South Africa, 2016:2). Innovation policies that pursue the acquisition of international knowledge have traditionally focused on reinforcing the reliance on foreign investment, joint ventures and imports of capital goods (Ernst & Kim, 2002:1419-1424). It may be highlighted that the importance of systematic outward-oriented trade and investment policies in education and training (a set critical of absorptive competences), S&T, and R&D as important components of maximising knowledge flows in LDC. Lundvall and Borrás (1998:35) emphasise the concept of a “learning economy” as critical for economic development rather than relying on existing knowledge stock (Lundvall & Borrás,

1998:35) in African region. Also important is a country's significant level of absorptive capacity, the ability to assimilate and internalise the disseminated knowledge for diffusion of innovation (Cohen & Levinthal, 1990: 136, 148, Narula & Marin, 2005:7). Developing countries, to a great extent are dependent on the knowledge created in the larger OECD countries (Kokko, 2010:113; National Research Foundation(NRF) South Africa, 2016; OECD, 2016;3), which still remains relatively isolated from global innovation dynamics (Hobday, 2003). The local selection, assimilation and adaptation of knowledge are central in applying and re-inventing international knowledge locally.

According to the World News Global (2016), the emigration rates of highly-educated citizens to OECD member countries are a major social problem for the developing world, with a negative effect on African research and knowledge systems. The proportion of highly educated people from LDC residing in OECD countries is significant for Jamaica (46%), Tonga (46%), Zimbabwe (43%), Mauritius (41%), the Republic of Congo (36%), Belize (34%) and Fiji (31%) (World News Global, 2016).

South Africa was an influential centre for intra-African research collaboration before the year 2000. However, during 2004-2008, key focal points included Senegal, Cameroon, Nigeria, Uganda and Morocco. Networks and universities in South Africa, Nigeria, Egypt, Kenya, and Burkina Faso indicated poor intra-African collaboration (Nwaka, Ilunga, Da Silva & Verde, 2010:4). Beyond regional collaboration, there is also increasing 'south-south' collaboration, for example, between India, Brazil and South Africa recently joined forces through the science and research 'IBSA initiative' (UNDP Millennium Project, 2005). The China-Africa S&T partnership programme (CASTEP) was launched in 2009, with the Chinese partners providing funding for African scientists to study in China, as well as funding for research equipment on return home. A study that analysed journals indexed by Thomson Reuters between 2007 and 2011 found that Africa's heavy dependency on international scientific collaboration may be stifling research individualism and affecting the continent's research evolution and priorities.

AFRICAN REGION INNOVATION INDICATORS

The R&D surveys conducted by the ASTII AU-NEPAD (2010: xx) identified two indicators relevant to the African region NSI, namely: the GDP expenditure on R&D by source of funds and sector of performance; and (ii) R&D personnel by level of formal qualification and occupation, gender, headcount and full-time equivalent, as well as researchers by gender and field of study/research. Table 1 presents some of the indicators of NSI performance.

Table 1. Indicators of innovation performance

	INDICATORS (BENCHMARKS)
Input indicators	<ul style="list-style-type: none"> • R&D Expenditures (at both micro and macro level) • R&D Personnel • Number of institutions conducting R&D • Expenditures in higher education
Output indicators	<ul style="list-style-type: none"> • Production of technology-intensive goods • Scientific publications • Citations to patents and publications • Number of Innovations • Exports of technologically-intensive goods and services • University graduates in S&E • Personnel flows among organisations
Flows	Knowledge flows, including
	<ul style="list-style-type: none"> • Technology transfer • Technological alliances • Machinery diffusion
	Financial flows, including
	<ul style="list-style-type: none"> • Venture capital for new high-technology firms • Government subsidies for R&D • Regulatory flows • Intellectual property legislation • legislation on standards • Anti-trust and cooperative rules and laws
	Human flows
	<ul style="list-style-type: none"> • University graduates supply and demand by discipline and institution
Ratios and indexes	GERD/GDP
At NSI level	<ul style="list-style-type: none"> • Revealed technological advantages • Input/output macroeconomic ratios • Trade balances on high-technology goods and services
At the organisation level	Input/output microeconomic ratios: patents and/or publication and /or innovation per unit of resource used (that is million dollar expenditure or per full-time researcher)

Source: Niosi (2002:299)

Indicators in Table 1 can be used in the African region to analyse (i) input indicators, (ii) output indicators, (iii) flows, and (iv) ratios and indexes.

CONCLUSION

The paper has identified a weak and fragmented innovation policy as a major challenge facing many African countries. The paper has further established that innovation policies should not simply adopt a science-push approach to innovation, but rather focus on building an entire system of innovation. The paper has also shown that several international organisations have played significant roles in the development of S&T and innovation policies among African countries. However, the article concludes that international organisations initiatives have mostly focused on the development of S&T with minimal emphasis on the role of policies and administration, which would increase learning and innovation performance in Africa.

RECOMMENDATION

This article recommends that Africa needs to formulate its own development paradigm that considers the unique socio-economic, political and environmental character of the continent. A successful innovation policy will require a clear vision to ensure a transparent regulatory and incentive structure and define possible technological trajectories in line

with the innovation objectives. The local selection, assimilation and adaptation of knowledge are will have to be central in applying and re-inventing international knowledge in the African region. Also important is Africa's significant level of absorptive capacity, the ability to assimilate and internalise the disseminated knowledge for diffusion of innovation.

This paper also recommends the importance of inter and intra African regional collaboration to enhance and increase the effectiveness of the research and overcome logistical obstacles by sharing costs, tasks and expertise. The collaborative activities will require a strong and committed research community and an active network of collaborating research institutions.

Efforts to improve innovation policy in Africa will have to include more joint research directed at informed policy formulation; collaborative programming among agencies; increased interactions and peer learning in the development of programmes, strategies and projects; and increased systematisation cooperation. A major commitment to improving and monitoring governance in Africa is essential. The importance of intra-African region dialogue and by drawing out both context-specific and generic country experiences for innovation policy developments is also crucial.

AUTHOR BIOGRAPHIES

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