POLICY BRIEF

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A NATIONAL FRAMEWORK FOR RESEARCH, INNOVATION, AND COMMERCIALISATION IN GHANA

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EXECUTIVE SUMMARY

Innovation hubs have become a conduit or workspace for nurturing innovative and creative ideas for the production of goods and services using improved technology to solve pressing commercial and social issues.

The Government of Ghana (GoG) is in the process of establishing the Ghana Innovation and Research Commercialisation Centre (GIRC-Centre), an entity that will harmonise innovations and research activities in Ghana, and commercialise these research and innovations. The Science Technology and Innovation (STI) ecosystem study was conducted to identify and map all existing research and innovation actors. Case studies of selected incubation and innovation hubs were also undertaken to generate relevant research evidence for the establishment of the GIRC-Centre in Ghana.

The study employed a mix-method approach for data collection. A desk review of the literature and existing policy documents, key informant interviews, and selected case studies were conducted.

INTRODUCTION

The Government of Ghana (GoG) has committed to the application of science, technology and innovation (STI) for national development to pursue the agenda of Ghana Beyond Aid. One of the several steps being taken by GoG includes the establishment of the Ghana Innovation and Research Commercialisation Center (GIRC-Center) to 'coordinate all ongoing research and innovation activities within the Public Research Institutions and Public Universities'. In addition, the Center will, 'harmonise innovations and research activities within the private sector, private universities and Innovation Hubs in the country'.

The STI ecosystem comprised a complex web of interactions among several organisations and institutions, where knowledge is the medium of exchange. The adaptive nature of the system makes it difficult to totally comprehend the ecosystem. Nonetheless, an understanding that is adequate for situating the GIRC-Center amid the complex web is pertinent.

It is in light of the above that the CSIR-Science and Technology Policy Research Institute, in collaboration with the Ministry of Environment Science Technology and Innovation (MESTI), conducted an analysis of the science, technology, and innovation ecosystem in Ghana.

The Objectives of the study were to:

1. Conduct a survey to identify all existing research and innovation actors (including but not limited to universities, private sector, NGOs, consultancies, etc.) in Ghana. Document their profiles outlining their ownership, where they operate, areas of innovation, stated functions and mission, and existing capacity.
2. Conduct a stakeholder mapping of the identified actors to highlight their areas of focus/strengths, functions (policy/regulations, research, and development), market/demand, financing, etc.
3. Conduct a SWOT analysis of the system actors to identify their current needs and future priorities.
4. Undertake in-depth interviews with selected actors and from that identify successes, gaps, and challenges facing the commercialisation of research efforts in Ghana

Research findings provide insights into the governance and institutional architecture of Ghana's innovation system, mandate, and functions of key actors, including 'missing actors'; inputs for policy, regulation, incentives, and rewards required to spur commercialisation of research in Ghana.

APPROACHES AND RESULTS

The STI ecosystem study employed a mix-method approach to elicit information to address the specific tasks of the study. This mix-method approach included desk research to review reports and literature in the areas of STI ecosystem studies, which then informed our approach to data

collection on the ground utilising key informant interviews, a one-on-one survey, and selected case studies. The actor-network analysis involved interactions with carefully identified stakeholders from a clustered grouping.

Actors in the STI ecosystem were identified and categorised into three broad groups, including research, policymakers, and commercial clusters. Three instruments were used to cater for the three different groups of respondents. One questionnaire was used to elicit responses from the innovation and research category and another questionnaire for the policymaking, and commercial categories. An interview guide was the third instrument used to elicit responses from start-up companies that had been supported by organisations in the innovation and research category.

Results show male dominance in the STI Ecosystem in Ghana (Figure 1). The gender disparity in Ghana's STI ecosystem is reflected in the percentage of male (85%) and women (15%) focal persons appointed by organisations in the research category of respondents, while for the commercial category, male respondents constituted 87% and female respondents constituted 13%.

There are attempts to improve the participation of women in the innovation ecosystem through specific programmes and projects. At the same time, deliberate efforts have been made by particular actors to recruit female participants during training. For instance, Ghana Tech Lab advertised its strong encouragement of women to enrol during its recruitment of trainees for its artificial intelligence training programme. The Ministry of Communication has launched a programme called 'Ms. Geek' as part of the gender gap recognition. The purpose of this programme is to empower women through a competition with the

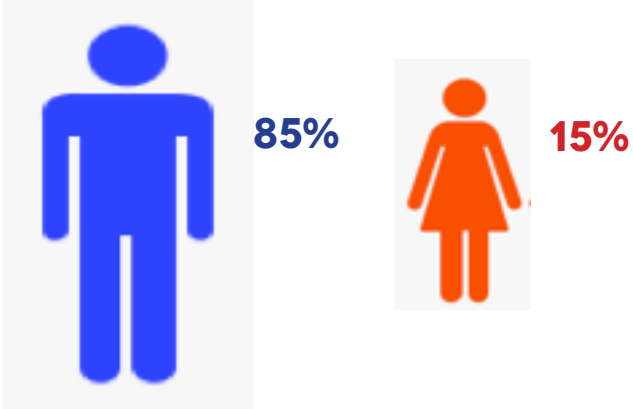


Figure 1: Gender Distribution of Respondents Among Categories of the Innovation Ecosystem

Science, Technology, Engineering, and Mathematics (STEM). An all-women technology lab was also launched in 2016 to help women start technology-driven businesses. Evidence from case studies also showed that Ho Node and EQWIP equally recognise the need to take steps to close the gender gap in the ecosystem (STEPRI, 2019).

Results also show a high concentration of innovation hubs in the two most populated urban cities in Ghana – Accra, and Kumasi in the Greater Accra and Ashanti regions, respectively (Figure 2).

Government organisations named as key actors of the ecosystem include the National Entrepreneurship and Innovation Programme, Ministry of Business Development, Ministry of Trade and Industry, and Ministry of Environment Science Technology and Innovation. For the private sector, relevant organisations named include Ghana Tech Lab, MTN, Vodafone, Association of Ghana Industries, and Ghana Hubs Network. For the financial sector, the most important banks identified were Agricultural Development Bank (ADB), Stanbic Bank, Ecobank, Cal Bank, National Investment Bank (NIB), and Universal Merchant Bank (UMB). Besides, the study identified key development partners that are critical for the innovation ecosystem. Among these are GIZ Ghana, British Council Ghana, Delegation of German Industry and Commerce in Ghana (AHK Ghana), and the European Commission. Proper coordination of programmes, projects, and interventions among these organisations is crucial.

In addition, the top private sector actors in the ecosystem (as identified by this study) include the two biggest telecommunication companies in Ghana, Ghana Tech Lab, AGI, and Ghana Hubs Network. This point suggests intense activity in the digital innovation space.

Interactions among the categories of actors in the innovation ecosystem remain critical. Figure 3 depicts the need for constant interactions among STI Ecosystem actors and stakeholders within an enabling environment for the effective transfer of technologies and creative innovations.

The study found that the innovation and research category interacted most of the time with government organisations followed closely by interactions with the private sector (Figure 4a). The financial sector organisations edged the non-classified group labelled 'other' organisations (which was dominated by donor agencies and organisations) for the third most important sector to the innovation and research category of the innovation ecosystem (see Figures 4a).

For the combined categories or policymaking and commercial actors,

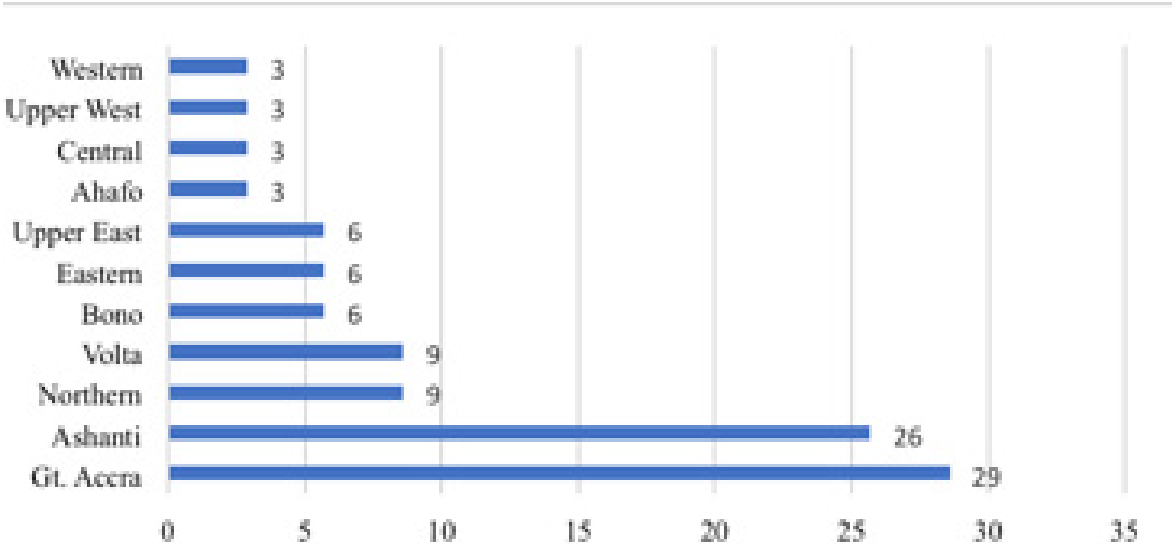


Figure 2: Geographical Distribution of Respondents in Innovation and Research Category (%)

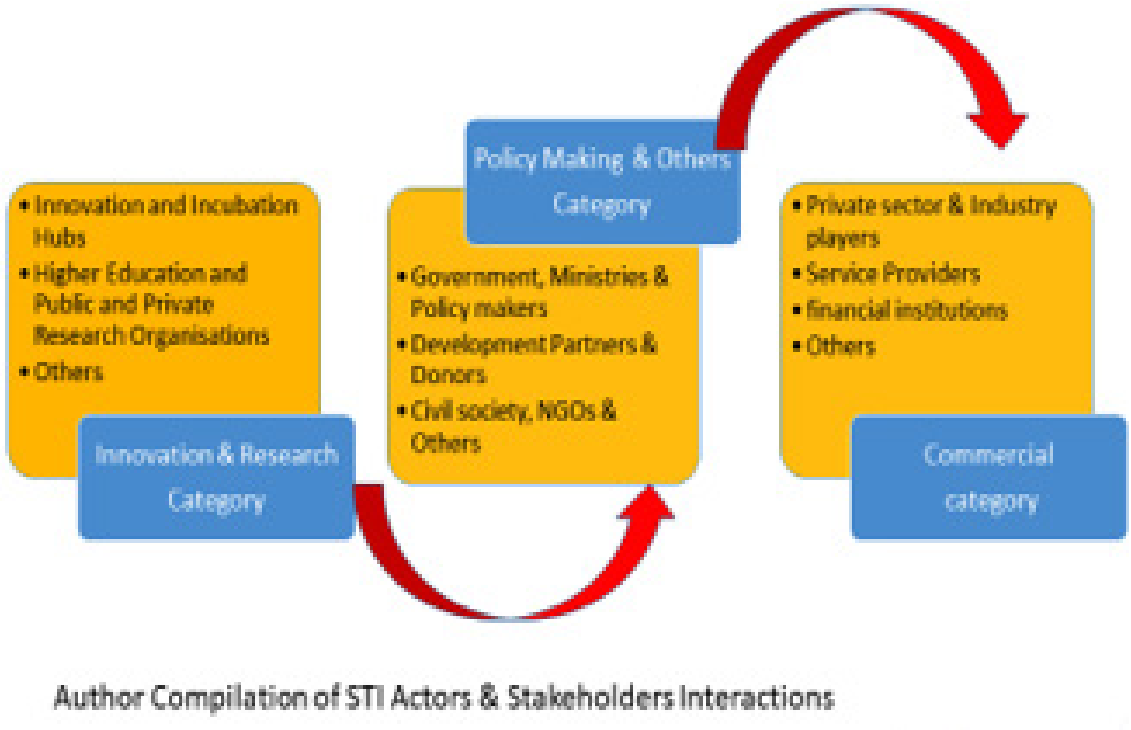
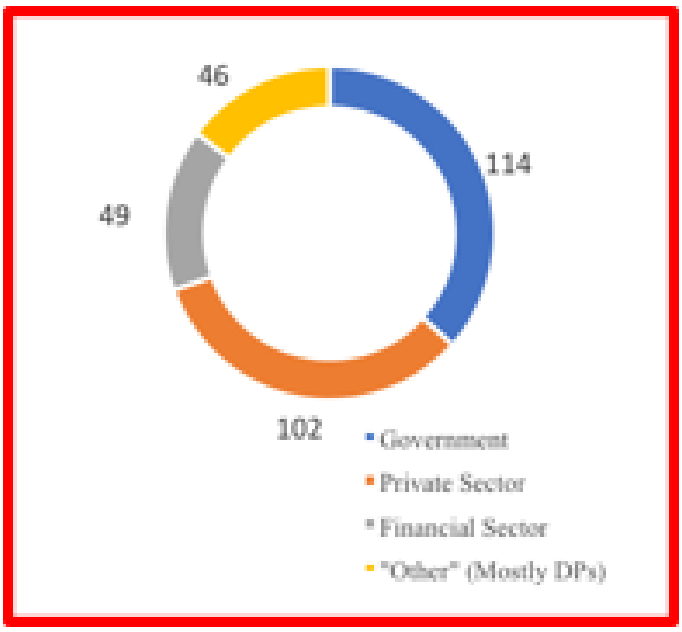


Figure 3: Interactions Among STI Ecosystem Actors

linkages to government organisations and institutions were also critical. This move was followed by interactions with the private sector, financial, and then the non-classified group 'other' (Figure 4b). As illustrated by Figure 4, it is clear that the public sector is very vital for the functioning of the innovation ecosystem.

It is essential to underscore the fact that in the innovation ecosystem, there are several enablers of interactions among the actors, including policies, programmes, and laws. Some examples of policies and programmes listed by respondents include the following:

- One District One Factory (1D1F) Programme a government programme that has the main goal of establishing at least one factory in each of the districts in Ghana. This programme is promoting entrepreneurial thinking at the local level;
- The Planting for Food and Jobs aimed at promoting growth in food production and create jobs across the country. Hence research and higher education organisations have been engaged;



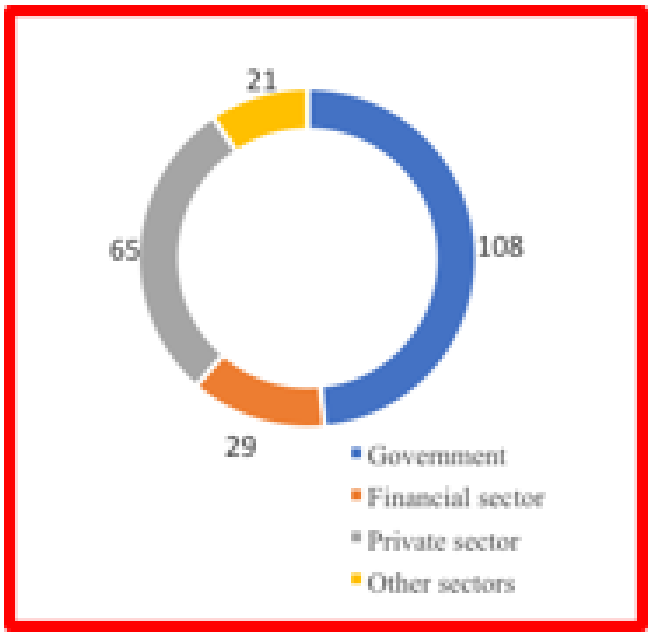


Figure 4: Most Connected Sectors to Categories of the Innovation Ecosystem (Frequency)
(4a) Innovation and Research; (4b) Policymaking and Commercial Categories

- The National Youth Policy supports the mainstreaming of entrepreneurial development in schools;
- The Act establishing the Council for Scientific and Industrial Research (Act 521) empowers the CSIR to commercialise research outputs;
- The Data Protection Act (Act 843), which has been key for the flourishing of the digital innovation space;
- The Ministry of Business Development' Policy of 5-year tax-free for start-ups and SMEs, which is critical for start-ups; and
- The private-public participation policies and Private Sector Development Plan, which support the involvement of the private sector in publicly funded procurements.

SWOT ANALYSIS OF THE INNOVATION ECOSYSTEM IN GHANA

Strengths

The strengths of higher education institutions were listed to include greater human resources capacity for education and training in several areas such as engineering, technology development. In addition, the higher education institutions had strengths for research and technology development, available infrastructure in the form of office space, laboratories, and ICT facilities. The main strength of incubation and innovation hubs lies in their capacities to incubate entrepreneurs and small businesses from the stage of idea to market.

The hubs provide tailor-designed pieces of training to the entrepreneurs and small businesses to help them develop their ideas into products and services and to start and grow their businesses.

For the policymaking category, their strengths included making and implementing policies, facilitating collaborations, fund mobilisation and allocation, infrastructure provision, and proposing legislative reviews. For actors in the commercial category, their strengths included consuming products and services from R&D activities, export market search and development, provision of export information, facilitating access to finance for MSMEs, facilitating linkages, and project appraisals.

Weaknesses (Challenges)

Among the higher education organisations, two weaknesses were paramount, namely weak linkages to the private sector and the inability to secure funding for research and development activities. The issue of weak linkages between the academia and private sector in Ghana has been a major problem militating against the successful transformation of research output and technology in academia to products and services.

For the Incubation and Innovation hubs, securing funding support for start-ups was a major weakness. Except for a few hubs, centres were weak in funding their start-ups. For policymaking organisations, their weaknesses included difficulty-accessing evidence (research) to inform policy, weak coordination of R&D and innovation activities, limited use of technology to disseminate information, and inadequate technical personnel. Weaknesses among actors in the commercial category include changing the narrative about entrepreneurship among the youth, the ability to diversify sources of funding through innovative approaches, weak linkage to R&D institutions, and limited capacities in critical areas.

Opportunities

The incubation and innovation hubs identified a wide variety of opportunities, among them favourable government policies, programmes and interventions such as, the National Entrepreneurship and Innovation Programme, Business Development Programme, Business to Business (B2B) matching, available donor funding for SDGs related business, building young talent locally to localised externally procured technology and services. Others are developing the business aspect of tourism and Leveraging on Double Track System to design programmes for SHS graduates, Tech parks, and zoning out part of Accra as a spatial niche for innovators Coding for children. African Continental Free Trade Area (AfCFTA) has been identified as an opportunity- a major single market for goods and services to foster intra-regional trade.

Threats

Some of the threats to the STI ecosystem actors include; cyber security and internet fraud, high cost of power, an influx of foreign competitive products and downward pressure on prices of locally produced goods and services, bureaucratic delays in certification by regulators, and up scaling of hubs without regulation.

IMPLICATIONS AND RECOMMENDATIONS

Under-representation of females at the top level of the innovation ecosystem could have implications for decision-making and governance.

interventions have been rolled out over the years to revert the situation, outcomes have been far below expectations. Currently, there are attempts to improve the participation of women in the innovation ecosystem through specific programmes and projects, while deliberate efforts have been made by specific actors to recruit female participants during training and capacity building innovation and entrepreneurial skills. Underrepresentation of women in STEM has to underpin systemic and institutional barriers that have to be properly understood through research.

Recommendations

Generate research evidence that can support policymakers in designing effective interventions to tackle the problem.

Include women's needs and strategic interests in the establishment of GICR for the effective transfer of technologies and innovations.

It emerged from the study that there is a geographical concentration of the ecosystem actors in the two major cities of Accra and Kumasi. Such a concentration is the result of deficiencies in national development planning that has historical backgrounds, and which further serves to entrench regional inequalities in Ghana. It was recommendation that deliberate strategies should be designed that targets the goal of spreading innovation ecosystem actors (especially incubation and innovation hubs) across the country.

The stakeholder mapping revealed that Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), British Council, and European Commission are important development partners acting in the innovation ecosystem. It was recommended that the Ministry of Environment, Science, Technology and Innovation (MESTI) develop a strategic paper or roadmap based on which development partner to engage. This approach will ensure that activities in the innovation ecosystem are addressing national development priorities.

It is important to underscore that the financial sector is an important part of the innovation ecosystem with specific banks (ADB, Stanbic, Ecobank, Cal Bank, NIB, and UMB) having been named as key actors. Given that funding was identified as a major challenge of the ecosystem in general, having banks on board means that the potential to obtain funding from the financial sector is substantial.

However, issues such as, regular engagements between research organisations and the banks have to be worked out to enable the sharing of ideas and information. It is recommendation that research organisations have to adopt the appropriate means to communicate their research findings with bankable outputs and innovations for commercialisation to the banks. In so doing, their understanding of the banks for decision-making is enhanced. This approach makes it easier for banks to know what is needed for the commercialisation of research and innovations.

The innovation ecosystem of Ghana has several areas of strengths, weaknesses, opportunities, and threats. Key areas of strengths identified include; the abundance of human capital in terms of numbers and areas of expertise. In addition, there is the strength of abundant human capacity for research and development, albeit skewed towards the agricultural sector.

It is recommendation that higher education institutions and research organisations be encouraged and supported to design and implement R&D programmes that target other sectors of the national economy. In addition, these organisations should be encouraged to upgrade the skill sets of their human capital to enable them to be competitive in the global economy.

Incubation and innovation hubs in Ghana have a strong network that is supportive of individual hubs, so they, in turn, support the development of ideas and innovations for commercialisation. This is the strength of the innovation ecosystem. Futhermore, incubation and innovation hubs have strength in start-up development. In so doing, any efforts towards the

commercialisation of research and innovation should make use of them. It is recommendation that support for incubation and innovation hubs should be part of the strategy for research and innovation commercialisation in Ghana.

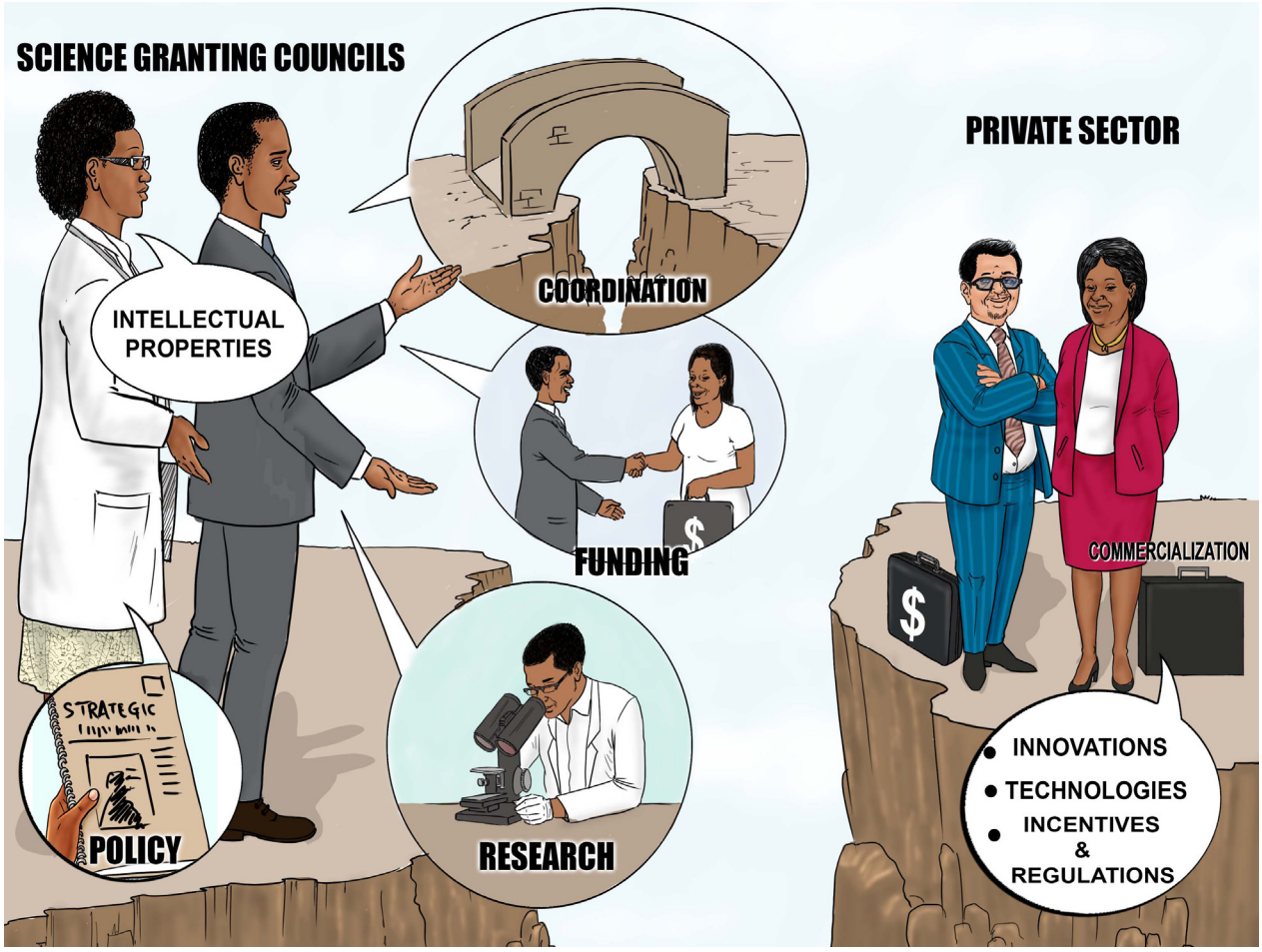
CONCLUSION

There are a number of national policies that have provisions that support research and innovations, albeit mostly from within specific organisations. Although most of these policies do not necessarily have provisions that facilitate commercialisation, there are possibilities for doing so. Yet these possibilities lie mainly within the ambit of the organisations using their discretion under their corporate social responsibility plans to make allocations to research organisations to support research and innovation commercialisation. But this is inadequate.

It is therefore recommended that a national strategy be drawn to cater for the commercialisation of research and innovations. This assertion supports the establishment of the Ghana Innovation and Research Commercialisation (GIRC) Centre. Some of the research institutes and universities have begun establishing incubation and innovation hubs to incubate entrepreneurs and to commercialise research findings. These efforts need to be encouraged and supported under a national framework or strategy.

The weak linkage between traditional research and development organisations and the private sector in Ghana requires conscious and innovative efforts to address. It is recommended that the research organisations adopt the hubs' approach to pursue commercialisation of their research and innovations.

The major threat to the innovation ecosystem was the inadequacy of funding. Funding for research and development is inadequate, the same for developing and improving the capacity of human capital, expanding infrastructure, and providing competitive remuneration to retain staff and experts. Thus, the Ghana Innovation and Research Commercialisation Centre (GIRC-Centre) should be established with careful thought and clear plans to provide it with a sustainable model of funding. The proposed National Research Fund should emphasise research and innovations that have the potential for strong research-private sector linkages and high commercial applicability.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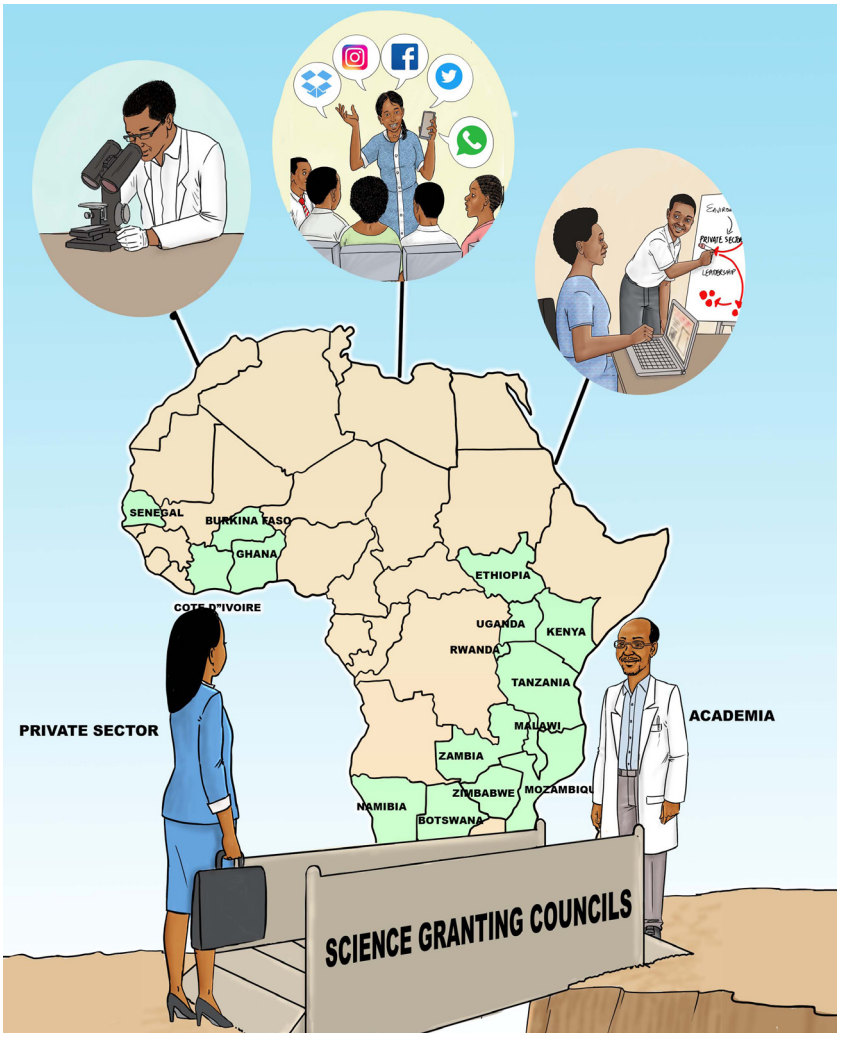
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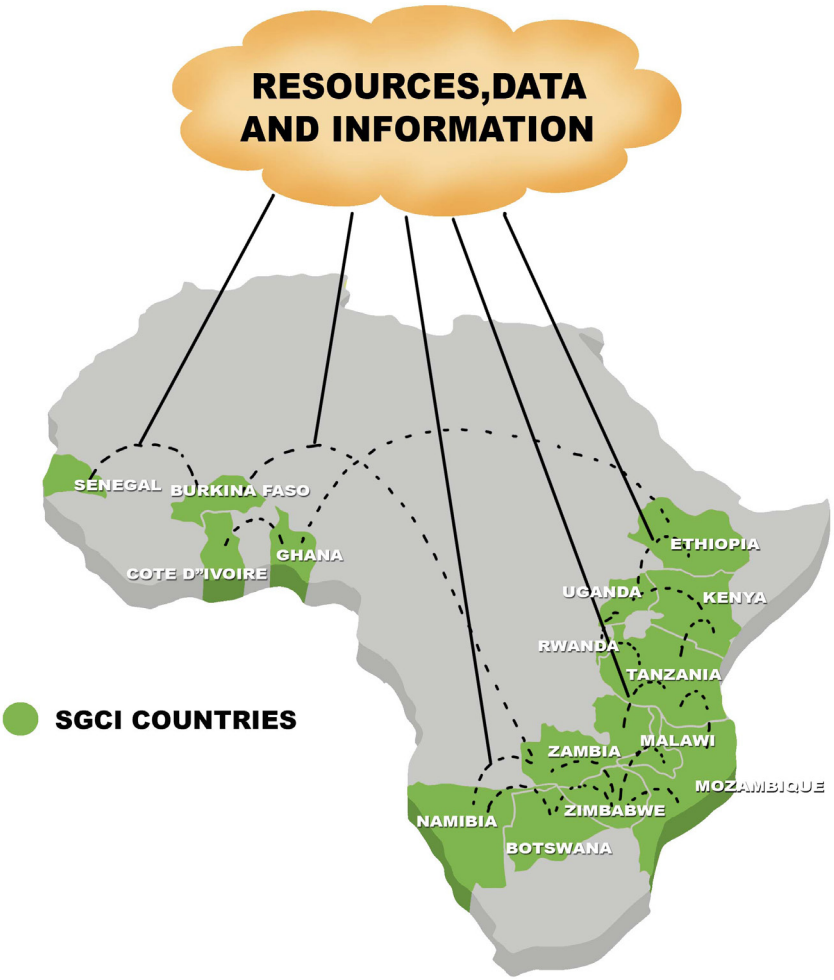

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