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Artificial intelligence research in sub-Saharan Africa : Bibliometric review and a case analysis of Mauritius contributions

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It is recognised that Artificial Intelligence (AI) is key to economic growth and sustainable development. On a global scale, it seems that Sub-Saharan Africa (SSA) is amongst the least advantaged region to harness the potential of AI to boost economic growth. A need to identify relevant practices to facilitate AI readiness in this region is clearly felt. Bibliometric analysis using Scopus as well as a desktop study were used to identify the top performers in AI Research in SSA and the best practices to promote AI Readiness. Infrastructural development, Human Resources, International partnerships and a sound governance framework were found to be key to leverage on AI for development. However, this paper also identifies a sound Science, Technology, Engineering and Mathematics (STEM) base to be a key step to allow other best practices to graft on. This should probably be the starting point for many countries in the region.

Keywords: *Artificial intelligence, Sub-saharan africa, STEM, Bibliometric, AI readiness.*

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1. Introduction

There is universal recognition that innovation is actually essential for economic growth and sustainability [1, 2]. It is recognised that Information Technology is crucial for economic growth and sustainability, given the

strong links between technology and national economic prosperity. A study was carried out in 120 nations between 1980 and 2006. It was found that for each 10 percent point increase in broadband penetration contributes 1.2 to 1.3 percent a country's gross domestic product [3]. Hence, many countries are investing in technology which when coupled with organizational changes, can give rise to powerful new efficiencies and economies of scale [4]. The latest development in this new dominating era of technology has been Artificial Intelligence (AI). AI has completely transformed business environment and is making a huge impact in all sectors of the modern world, including marketing, healthcare, cybersecurity, art and military amongst others. [5-7].

AI has been proclaimed as one of the most disruptive technologies of the 21st century. It may be defined as "the capability of a machine to imitate intelligent human behaviour" or "an agent's ability to achieve goals in a wide range of environment" [8]. AI is geared towards the development and deployment of intelligent systems that can be used for effective and efficient decision making from big data analytics especially in relation to the 17 Sustainable Development Goals (SDGs) [9,10]. Consistently, it has been reported that AI can help in achieving 134 targets across all the goals, but it may also inhibit 59 targets [11]. Indeed, AI contributes in reducing poverty, increasing education, supporting health-care delivery, increasing food production, expanding the capacity of existing road infrastructure by increasing traffic laws, improving public services and bettering the equality of life for people with disabilities [12]. One of the major achievements of AI has been in fighting the latest pandemic that has revolutionised the entire world. With its evolution of better diagnostics capabilities and monitoring, it is being extensively used across the world in tackling various aspects of the COVID-19 crisis which includes predicting and forecasting viral dynamics as well as in the identification and development of therapeutic drugs that can help the medical field to combat any other pandemic crisis [13].

Indeed, AI has become a powerful technology that is rapidly progressing in all domains, impacting all aspects of innovation. Hence, there is much focus in the least developing economies to ensure that the society takes full advantage of AI while being protected from the associated risks. Hence, scientists as well as the community at large have taken interest in the regulatory and ethical frameworks to achieve a "good AI society".

At present, the top ten countries in Sub-Saharan African country is not well-equipped to benefit most from AI and other emerging technologies [14]. Africa is well positioned to take advantage of digital technologies to bring about transformation and enhance competitiveness. In order to achieve these objectives, global initiatives in terms of knowledge-transfer are important to support capacity development. The need for Africa to leverage on AI for its development has been highlighted since 2018, this development should be embedded within ethical and human rights standards [15]. A number of initiatives has been implemented by the International Development and Research Centre, this includes the AI for development (AI4D) initiative aiming at a network of AI excellence in Sub-Saharan Africa [16].

According to the Government Readiness Index Report [17], the top Sub-Saharan African country is Mauritius (45th position), followed by South Africa (59th), Seychelles (68th),

Kenya (71st) and Rwanda (87th) [17]. These results are to be expected, as African countries are still fighting basic issues related to universal access to electricity, the mechanisation of production, and automation of industries. Nevertheless, efforts are being made to be at par with the innovative countries. Brandusescu et al. [18] and Smith and Neupane [19] provided examples of innovative AI applications in Kenya, Nigeria, South Africa, Uganda and Ethiopia in the fields of health, agriculture, FinTech, public transportation, and language translation. Applications of AI in Africa have cut across a wide array of sectors from social media postings and peace building [20] to the Hello Tractor AI platform developed for the farming community in Nigeria [21].

As AI is an emerging sector of worldwide interest, databases of AI policies and governance frameworks are being set up to ease knowledge transfer and sharing. One major factor impacting on the readiness of countries to implement AI activities is the level of research in AI. The structure in AI Research in terms of collaborations, fields of study and sources of publications can be used to identify good practices in advanced AI societies. Bibliometric analysis is a tool that can identify these trends. It is a type of well-established method in intelligence science [22] and publication output in different regions and fields as well as in depicting collaborative trends [23, 24]. In fact, there are many works that have been reported on using bibliometric indicators to quantitatively analyse the published literature on Artificial Intelligence [25-29]. However, there is scarce documented information regarding Sub-Saharan African initiatives. This study is a step towards addressing this gap. Bibliometric analysis was used to identify and analyse the top 15 economies conducting research on AI in the Sub-Saharan Africa; the policy measures, capacity needs and legal frameworks established in these countries were also analysed. Mauritius was used as a benchmark given it is the highest-ranked African country in the Government AI Readiness Index [17].

The specific goals of this study are to:

1. Identify the top 15 productive countries in Sub-Saharan African in terms of AI publications.
2. Analyse the policy initiatives being implemented in the identified countries, with a specific focus on Mauritius.
3. Identify the source of research publications in the identified countries.
4. Assess the most frequent fields where AI is being implemented.
5. Evaluate collaborative patterns in AI.

This study will allow the identification of human and institutional factors that are conducive to research in AI and the formulation of potential recommendations that can be adopted by African States to respond to the challenges and opportunities of AI for sustainable development.

2. Methodology

The data reported in this study were retrieved using Scopus, which is a multidisciplinary database indexing more than 15000 International peer reviewed journals in the field of Science and Technology. The following search string has been used to download the data from the database from the year 2011 to 2020 (Last date data retrieved: January 2022):

(TITLE-ABS-KEY (artificial AND intelligence) OR TITLE-ABS-KEY (machine AND learning) OR TITLE-ABS-KEY (deep AND learning) OR TITLE-ABS-KEY (artificial AND neural AND network) OR TITLE-ABS-KEY (natural AND language AND processing) OR TITLE-ABS-KEY (computer AND vision) OR TITLE-ABS-KEY (machine AND intelligence)) AND (LIMIT-TO (AFFILCOUNTRY, "Mauritius"))

Bibliometric analysis was carried out for the 48 Sub-Saharan countries [30]. A total number of 6508 documents related to AI publications were obtained. Out of the 48 countries, 5 countries namely, Equatorial Guinea, Eritrea, São Tomé and Príncipe, South Sudan and Swaziland had no publications on AI. The top 15 countries with the most number of publications were identified and their AI profiles in terms of publication trend, most popular research areas and most productive institutions have been presented. An in-depth bibliometric analysis was carried out for Mauritius, being ranked 1st in the Global Innovation Index 2020 and Government AI Readiness Index 2020 in Africa.

For policy dimensions, journal articles, books, electronic sources, conference papers and reports were consulted. Data on R&D expenditure and number of Researchers for Higher Education sector were obtained from the national survey carried out by the Mauritius Research and Innovation Council using the standard questionnaires developed on the UNESCO R&D survey based on the Organisation for Economic Co-operation and Development (OECD) Frascati Manual 2015 [31]. Raw data for tertiary levels were obtained from reports available on the Higher Education Commission website (https://www.hec.mu/pub_rep).

3. Results and Discussions

3.1 *Publication Trends for the Sub-Saharan Economies*

A total of 6508 publications related to AI was retrieved from the Scopus database. The top 15 most productive countries are listed in Figure 1, representing 95% of the publications from Sub-Saharan Africa. Of these 95%, 2913 were primary articles with the remaining consisting of conference papers/proceedings (2758), reviews (220), book chapters (156), data papers (24) and editorials (20) amongst others. South Africa ranked the first place with the highest number of published articles (3236) followed by Nigeria with a difference of about 2000 articles. Mauritius is ranked 7th with a total number of 117 articles.

According to some scholars, the successful implementation of AI lies on the adoption of the following pillars: Strategy (policies and strategies), Infrastructures (Centres of excellence, start-up, incubation centres), People and Organization (capacity building, multi-stakeholder partnerships, and Governance (Legislations/Regulations) [32, 33]. The existence and dynamism of these pillars vary from countries to countries.

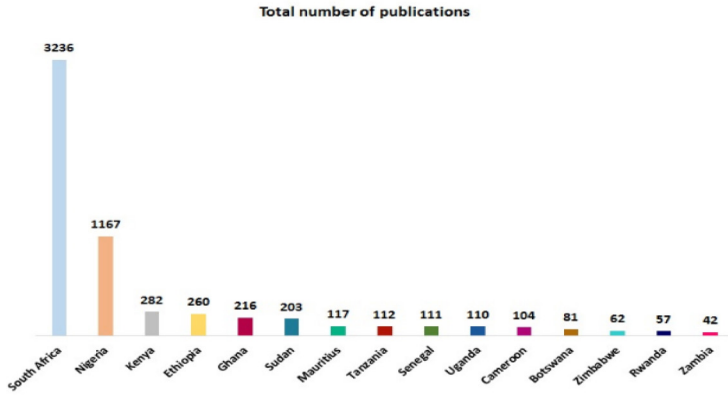

Figure 1

Top 15 Most productive countries (2011-2020)

Out of these 15 African nations, only South Africa, Mauritius, Senegal, Cameroon, Zimbabwe, Rwanda and Zambia have either developed or launched an AI National strategies and policies. Kenya, being the third among the most productive economy in AI publications, has an AI taskforce that is working towards a national strategy [34]. Mauritius has published an AI strategy, which was released in 2018, along with the Digital Government Transformation Strategy 2018–2022 and the Digital Mauritius 2030 Strategic Plan [35, 36]. One of the main focus of the strategy was to set up an AI Council to advise the Government on supporting Mauritius' AI ecosystem. This can be seen clearly by the maximum score of 100 scored by Mauritius on the indicator 'Vision' in Government AI Index 2020 [17]. In South Africa, the Draft National Data and Cloud Policy (in Government Gazette no. 44389) has been published [37]. The Policy aims at providing data and cloud services, all directed towards economic growth and inclusivity.

An economy has to constantly evolve and transform to meet the changing expectations of the latest technological revolution. It is hence crucial to have the proper resources and environment to ensure the successful implementation, processing and growth of AI. With regards to infrastructure, most of these countries have invested on Centres of Excellence, start-ups and incubation centres, which support AI ecosystems and which provide a platform for experts to develop their ideas into new businesses. For example, South Africa has developed AI centres and programmes on the continent to promote knowledge, acquisition and mobilization of AI [34]. In addition, the University of Pretoria created the Intelligence Systems Group (ISG) [45], which specialises in the theory and application of systems that perceive, reason, learn and act intelligently [38]. South African AI start-ups are beginning to show signs of progress and listed by Memeburn's Digital Allstars early in 2017. Indeed, South Africa, amongst the African nations being assessed in the Government AI Index 2020, has the highest score on the indicator infrastructure [17]. All these progressive initiatives, amongst others, no doubt, does impact on the research output on the country, reflecting on its number of publications. Substantive progress has been

recorded in Senegal with its digital framework and in Ethiopia where close academic/ entrepreneur partnerships are being forged in its AI & Robotics Center of Excellence [34, 39]. However, countries like Nigeria, Ghana, Sudan, Mauritius, Sudan and Uganda have to work more on this pillar to bridge these AI capacity gaps.

In addition, it is well known that isolated initiatives are not enough to address digital transformation from a systemic perspective. Hence, the role of multi-stakeholder international partnerships should not be dismissed when working on strengthening the ecosystem of AI [40]. These partnerships create a multi-disciplinary ecosystem comprising of diverse resources, skills and experiences. The roles of the different stakeholders and how they can best collaborate needs to be clarified. Ethiopia has been initiating strategic partnerships for AI adoption on the continent [34]. For examples, the collaboration of Uganda with the UN and Huawei have allowed the use of machine learning and drones to address issues of population displacement and persecution in other African countries, as well as establishing an AI-powered facial recognition surveillance system [34].

Having adopted all the three pillars discussed above, it is important to work on the good governance which leverages on good practices to ensure safe, ethical, and trustworthy AI. The morale issues associated with high-tech system require appropriate legislative frameworks that can function increasingly independently of humans, gives rise to a range of important moral questions. Hence, it is important to have a proper legislative framework that will facilitate the establishment of intelligent AI adoption. Out of these 15 countries, 6 countries are not well equipped to address the ethical requirements of AI. These include Sudan, Tanzania, Ghana, Uganda, Botswana and Zambia. Much efforts and support are needed in these countries that will address a mix of factors such as expertise, capacity building, access to digital technologies and governance.

The AI publication profile of South Africa clearly shows that the investment and effort made by South Africa on the four pillars above are helping the country to lead in the Sub-Saharan Africa to prepare themselves to benefit from the opportunities of AI. Moreover, the 3236 publications obtained for South Africa clearly demonstrates that the successful implementation of AI lies on these stakeholders namely; Centres of Excellence and Higher Education Institutions. These stakeholders no doubt increase the capacity building of the country and are the major vehicles of research output. This will be further discussed in section 3.3.

3.2 *Distribution of research fields*

For the past 10 years, 28 research fields related to AI were found for the top 15 Sub-Saharan countries. Figure 2 shows the top 10 research fields with the number of publications. The top research field is Computer Science (3274), followed by Engineering (1783) and Mathematics (967). Among the top 15 most productive economies, the top research area was found to be Computer Science as expected except for Zimbabwe and Rwanda, where Engineering and Chemical Engineering were the fields with highest number of publications respectively. These results are in accordance with studies carried out by Lei and Lu [41],

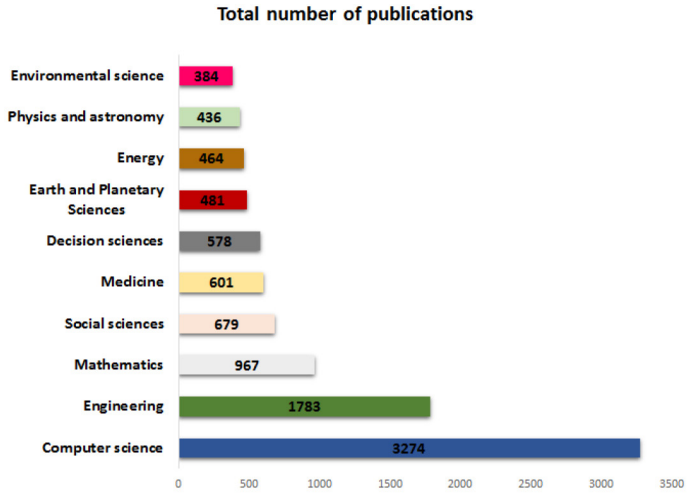

Figure 2

Top 10 Research Areas with Publication Numbers (2011-2020)

Marimuthu and Tamizhchelvan [42] and Wamba et al. [43], where it was found that highest number of publications are in research areas of Computer Science.

Though Computer Science is the field where AI has been explored the highest, it should not be dismissed that AI remains highly interdisciplinary. Hence a comprehensive approach is required. This includes social sciences, analytics, design skills as well as soft skills like emotional intelligence. In addition, behavioural science and soft skills such as emotional intelligence are required to build solutions that understand, mimic, and interact with humans.

3.3 *Most productive Publication Institutions*

The analysis of institution distribution in bibliometric analysis is indeed helpful to get an overview of the research capacities around the world. The top productive institution for each 15 Sub-Saharan economy is listed in Table 1.

The results obtained show that the top productive institutions are Higher Education institutions, representing 20.2 % of total publications. The top positions occupied by the Universities are not surprising, knowing that conducting and publishing research are of utmost importance for academics. This is related to the recruitment and promotion process in higher education institutions which focus on research output. Publications are a tactic used by researcher to showcase their talents and attract funding [44]. This has led to a "publish or perish'' culture in academia.

In fact, AI has become a recognised and undeniable tools that enable all researchers with a powerful computing environment to conduct their work despite constraints in infrastructure and collaborate with other researchers in other countries. In fact, in

Table 1

Top productive institutions of AI publications (2011-2020)

Country	Top institution	Number of publications
South Africa	University of KwaZulu-Natal	509
Nigeria	Covenant University	209
Kenya	University of Nairobi	54
Ethiopia	Addis Ababa University	78
Ghana	University of Ghana	47
Sudan	Sudan University of Science and Technology	57
Mauritius	University of Mauritius	85
Tanzania	University of Dar Es Salaam	26
Senegal	Universite Cheikh Anta Diop	49
Uganda	Makerere University	63
Cameroon	Université de Yaoundé I	40
Botswana	University of Botswana	39
Zimbabwe	University of Zimbabwe	21
Rwanda	University of Rwanda	27
Zambia	University of Zambia	10

September 2019, Microsoft Asia and IDC Asia/Pacific released findings specific to the education sector for the study, Future Ready Skills: Assessing APAC Education Sector's Use of AI, where it was stated that Artificial Intelligence (AI) will help double the rate of innovation improvements for Higher Education institutions.

University of KwaZulu-Natal is ranked first with 509 publications and it formed part of the nine research groups founded by the Centre of AI Research, South Africa, which aimed at worldwide excellence in AI research [45]. It included the incorporation of two machine learning groups focused on deep learning with the collaboration of North West University. In fact, University of KwaZulu-Natal has been amongst the universities who were always in favour of adopting the latest technologies to work towards a society embracing AI. In fact, E-Learning was introduced for teaching and learning in 2010, with MOODLE being used as the learner management system. MOODLE is the official language machine system used at the university to communicate with students and for uploading lecture notes and library resources [46]. In addition, the University of KwaZulu-Natal's School of Law also held a virtual conference on Artificial intelligence in healthcare in South Africa: A practical approach to policy, on the 8th September 2021 as its upgoing endeavour to promote AI in its institutions.

The other Sub-Saharan nations are also making efforts to address institutional and expertise gaps. For example, Cameroon is in process of developing courses for AI [15] while Botswana is integrating AI in its academic curriculum. Rwanda, on the other hand,

is prioritizing AI in teaching and research agenda and Makere University in Uganda has successfully invested in the construction of AI and Data Science lab. No doubt, all these initiatives, have or will support the development of syllabuses and pedagogical competencies for AI skills and knowledge education, impacting on the number of publications produced by these institutions.

3.4 *In-depth bibliometric study for Mauritius*

3.4.1 Distribution of Research Fields for Mauritius

Figure 3 depicts the top 10 AI-related research areas for Mauritius. The top 2 fields of research are the same as the other Sub-Saharan Economies, with 84 publications in Computer Science and 49 in Engineering. Interestingly, for Mauritius, fields such as Agricultural and Biological Science, Business, Management and Accounting and Biochemistry, Genetics and Molecular Biology are found in the top 10, in contrast with the top 10 for the 15 Sub-Saharan economies.

Many scholars have argued that expertise in digital technologies is crucial for AI. But, AI literacy rather refers to effective skills in communication and collaboration for AI applications [47]. In this view, Science, Technology, Engineering, and Mathematics (STEM) education is essential to promote creative problem-solvers towards AI and provide students with opportunities to address problems in multi-disciplinary manner [48,49]. This might be one of the reasons accounting for Engineering and Computer Science to be the most popular AI Research field, including Mauritius. STEM education alongside integration of AI in government agencies are equally important [50]. Countries such as Ghana and Rwanda are promoting the participation of girls in STEM education while other countries like Kenya, Nigeria and South Africa are providing opportunities to potential female entrepreneur to integrate AI start-up ecosystem.

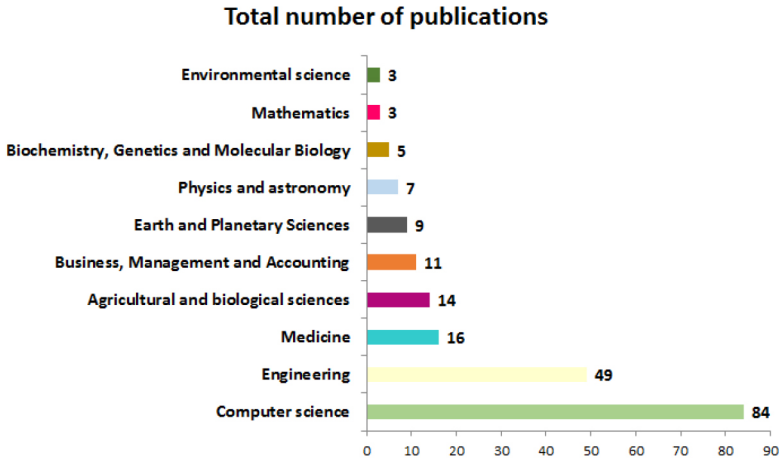

Figure 3

Top 10 Research Areas with Publication Numbers (2011-2020) for Mauritius

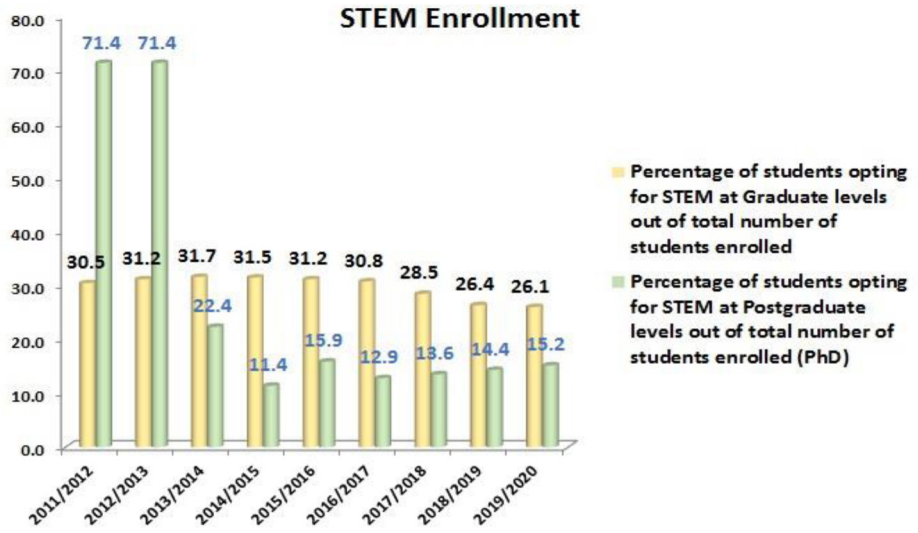

Figure 4

Enrolment for STEM at Tertiary and Postgraduate Levels for Mauritius (2010-2019)

Data for students opting for STEM at tertiary and postgraduate levels for Mauritius are depicted in Figure 4. A slight decrease is observed at tertiary levels as from 2016/2017, with Engineering and Information Technology being two most popular fields of study. However, the decline in STEM studies is more pronounced at postgraduate levels, with a decrease of 49% as from 2013/2014. In fact, a study carried out by Human Resource Development Council (HRDC) in 2017/2018 also confirmed that the participation rate of student in STEM, at both secondary and tertiary education was decreasing [51]. No doubt, the Government of Mauritius has understood the great need to promote the interest in STEM subjects at secondary levels. Hence, Mauritius has conceptualised a new project, the Early Digital Learning Programme (EDLP) project in collaboration with the Government of India [52], as a measure of its digital learning reforms. The Ministry of Education, Tertiary Education, Science and Technology made use of social media such as Facebook to promote Science, including organisation of webinars and other online events such as the African Code Challenge for students aged eight to sixteen years. The Rajiv Gandhi Science Centre (RGSC) has participated actively in promoting STEM by developing and circulating a number of programmes for teachers and parents online to conduct simple science experiments, organising the National Science Week 2020, travelling exhibitions and Continuous Professional Development Workshops. In addition, RGSC has organised career guidance workshops in secondary schools on the island and has reached out to about three hundreds students. Indeed, all these initiatives impact on the literacy and research in AI, accounting for AI in STEM fields and might increase the number of publications in the coming years.

3.4.2 Most productive Publication Institutions for Mauritius

The most productive institutions for Mauritius are from the Higher Education sector, with University of Mauritius, at the top, accounting for 53% of total AI publications. The total R&D expenditure for Higher Educations (HERD) for the financial year 2019/2020 has been estimated to be about 393 million rupees (national currency) [53], with 76% of the total of HERD being spent by University of Mauritius. Hence, the position occupied by University of Mauritius is not surprising. Based on national survey conducted for the financial year 2019/2020, the University of Mauritius has the highest amount of pool of researchers compared to other universities, accounting for 77% of researchers in Full-time Equivalence. Hence, University of Mauritius will produce more innovation outputs (publications) relative to its level of innovation investments in terms of R&D expenditure and human resources compared to other universities. In fact, the total number of publications, irrespective of field and areas, has always been the highest for University of Mauritius over the years, ranging from 88 to 417 for the years 2011 to 2020. Moreover, 28% of the HERD have been spent in the field of Engineering and Technology to promote AI in this sector.

However, other universities are also making efforts to increase their innovation outputs with regards to AI. For example, Université Des Mascareignes (UDM), in collaboration with the Ministry of Education, Tertiary Education, Science and Technology, has launched a master's programme in Artificial Intelligence and Robotics, which is delivered by a network of universities and awarded jointly by the UDM and University of Limoges (France). The University of Technology of Mauritius has created a School of Innovative Technologies and Engineering and has implemented the programme MSc Artificial Intelligence with Machine learning as well [54].

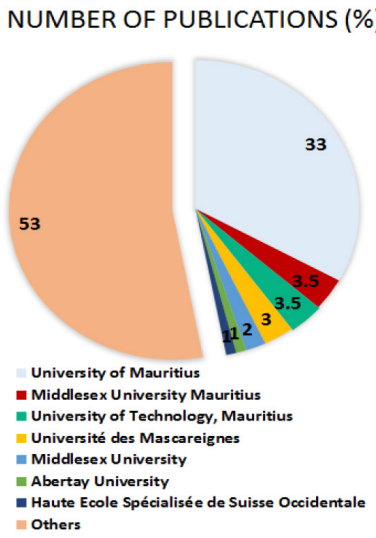

Figure 5

Most productive institutions for AI publication for Mauritius (2011-2020) in terms of percentage

3.4.3 Type of Collaboration

Collaborative publications for years 2011-2020 were analysed by using affiliations of co-authors, both at national and international levels.

3.4.3.1 Capturing collaboration between institutions

Table 2

Type of collaboration for AI publications (2011-2020)

Type of Collaboration	Number of Publications (%)
No Collaboration	45.3
Inter-institutional	11.1
Inter-institutional[a]/International	0.85
Inter-institutional/Intramural	0.85
Intramural[b]	9.40
Intramural/International	1.71
International	30.8

a: Inter-institutional means collaboration between at two least institutions in the same country

b: Intramural means collaboration between at least two persons within the same institution

The data highlighted in Table 2 shows that 45.3% of publications on AI involved no collaboration. In case where there was collaboration, it was observed that most of publication involved international partners. The top 3 International collaborating partners were India, United Kingdom (UK) and South Africa. In most of the top 15 Sub-Saharan economies, it is interesting to note that UK figures amongst the top 5 international collaborating partner for AI publications. UK is actively involved in AI research, with 43,508 number of publications for the years 2011 to 2020. In fact, UK is ranked second in the Government AI readiness report 2020 with a score of 81.12 and is the top-scoring country in Western Europe. Following the AI sector released in 2018, a number of initiatives are being launched by the Government, such as the creation of 16 New Centres for Doctoral Training at universities across the country. Moreover, a global partnership on AI has been created in 2020 by France and Canada along with some countries including European Member States, New Zealand, Singapore and the United States of America. This partnership aims at responsible use of AI within the principles of human rights, inclusion, diversity innovation and economic growth. Indeed, it would be very beneficial for Mauritius to work more on collaborating with UK and take advantage of their support to modern research facilities and practical implementation in AI related sectors. As for local collaboration, the low figures shown in Table 2 demonstrate that creation of a robust AI ecosystem will require more institutional commitment to AI-related activities given the multi-disciplinary nature of AI. In fact, studies have proved that both institutional competition and collaboration tend to lead to produce high-impact research [55, 56] and improve scientific performance [57]. Hence, in

order to promote and increase research output in AI, this type of collaboration should be probed more and supported by government policies.

3.4.3.2 Capturing collaboration between sectors

A sector-wise analysis for the publications of AI for Mauritius was investigated and the results are presented in Table 3.

Table 3

Type of collaboration for AI publications by different sectors of performance (2011-2020)

Type of Collaboration	Number of Publications (%)
Higher Education	46.2
Higher Education-Higher Education	43.6
Higher Education-Government	5.13
Higher Education-Industry	2.64
Government-Industry	1.71
Industry	0.855

It can be observed that 3 types of sectors are involved in publication of AI: Higher Education, Government and Industry. Most of the AI publications emanate from collaborative research between Higher Education institutions (43.6 %) and very few involve Government and Industry. In fact, with the rapid development of AI, collaboration is one of the tools that will help countries to strengthen their implementation stage of AI. Industry–University partnerships play a crucial role in achieving economic growth in today's knowledge-based societies [58,59]. Industry benefit from highly technical expertise such as researchers or students [60] and the business leaders gain access to technology and knowledge [61]. In addition, they can use modern research infrastructure [58]. Hence, the stakeholders from these institutions should analyse different approaches to build up a successful collaborative venture in AI research, which will impact on the AI capacity of both institutions. This could include courses on AI funded by business, placement of students in IT companies or collaboration on joint projects on AI. No doubt, the collaboration from Government will be of crucial importance as funding institutions or providing the appropriate framework for implementation of these projects. In fact, the UK Government Industrial Strategy stresses that addressing AI grand challenge requires collaboration between universities and the community and industry. This collaborative approach has guided the set-up of applied AI centres of excellence around the world [62]. These have contributed to retaining both national and international AI talent; upgrade digital infrastructure; ensure a business environment conducive to AI business and contribute to prosperity of society by making AI benefits accessible to all. In light of the above implications, the Government of Mauritius could use the same approach to incorporate AI into their missions and technologies. Despite the initiatives taken by

Government of Mauritius like building smart cities, finance and FinTech, fostering the entrepreneurial ecosystem, smart agriculture or AI-powered technologies in healthcare, the vast majority of research published in refereed scientific journals are from Higher Education institutions. So, somehow, the innovative inputs harnessed by Government in AI are not being captured efficiently and hence collaboration is of utmost importance to showcase and transform these initiatives efficiently. Indeed, collaboration is key and it is in the benefit of policymakers, researchers and practitioners that such partnerships are forged.

Conclusion

This paper depicts an interesting profile of the scenarios of AI research captured by Scopus in Sub-Saharan Africa, particularly in Mauritius. There are opportunities for using AI in several sectors and fields in Sub-Saharan Africa to enhance economic growth and development. This study has elaborated on the different initiatives and policies taken by these different economies to ensure successful implementation of AI and has shown that AI development depends on many factors, inter alia, strategy, infrastructures, people and organization and governance. STEM education, capacity building, centres of excellence, collaboration and funding amongst others are important to push ahead and make Sub-Saharan Africa be at par with other innovative economies like the United Kingdom. In the same line, data availability is also crucial for the development of strong AI ecosystems. Hence, it is very important to capture data on AI for different stakeholders, policymakers or researchers to be aware of the current status of readiness of the country to implement AI. South Africa, having the highest number of publications, and Mauritius, being the highest-ranked African country in the Government AI Readiness Index 2020, has been able to transform their innovation inputs into research outputs more or less efficiently and can be used as a benchmark for the future. However, in Mauritius, even though many initiatives have been taken by the Government, research on AI is centered in Higher Education institutions only. Clearly, stronger and intelligent strategies are needed to attract other sectors to emancipate in AI, which has become more of a necessity rather than a luxury in view of the disruptive innovation brought by the current pandemic. This will no doubt be achieved by enhanced collaborative innovation between the different sectors.

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