Artificial Intelligence (AI) in Uganda: Pro et Contra

AI concepts have been around for centuries and they've evolved through the first, second and third industrial revolutions without much attention, but the Fourth Industrial Revolution (4IR) has sharpened the focus on AI as a vital cog in the wheel of progress owing to the transformative role of information and communication technologies (ICTs) in driving exponential economic growth. Artificial intelligence is now driving the 4IR in the front seat making the industrial revolution go faster and beyond bounds than past industrial revolutions which moved in inch, it is going a mile. AI could add over $15 trillion to the global economy by 2030, and local economies could strengthen GDP by over 20% as robots and humans cooperate to solve the complex challenges of the planet.

Artificial intelligence is making rapid advances and lies at the core of the greatest technology evolution of our lives — leading to unprecedented transformation of the world economy. They then can use algorithms and calculations to mimic human intelligence revolutionising industries, spearheading innovations and creating new avenues for growth.

Its use cases — from self-driving cars and voice-activated assistants to predictive analytics and machine automation — pervade multiple industries, among them manufacturing, healthcare, finance and transportation. AI companies are coming up rapidly and there has been heated discussion among economists, policymakers and business leaders about the potential impact of AI on the economy of Uganda. However, from a more positive perspective, proponents view AI as oasis of tremendous productivity growth, innovation, and competitive advantage. AI technologies are crucial to improving business movements, providing productive strategic methods and reinforcing high-tech innovations, which leads to economic frequent production and improved economic growth. It enables companies to use their resources effectively, react to marketplace demands instantly, and promotes innovation and growth."

However, with great potential for the country, also comes hard-hitting challenges for labor markets, society overall, and ethical issues regarding the adoption of Artificial Intelligence (AI) in Uganda.

Whole swathes of jobs are being automated — or at least enhanced to become more efficient — and potential adoption of such systems for broader A.I. could result in a massive overhaul of the job market, one that many people fear will deepen poverty and heighten income inequality. Additionally, the challenges of data privacy and biases in algorithms amplify the importance of constructive regulatory frameworks and ethical guidelines governing the development and utilization of AI.

A case in point would be its potential for a transformative effect versus the challenges and threats with AI, which is still a fundamental divider between whether AI has positive or negative economic consequences.

As some African countries make strides towards AI readiness, others are being held back by structural inequalities and digital divides.

These challenges emphasize the need for an inclusive and holistic approach to ensure Uganda can leverage the potential of AI and close the gap with more advanced regions.

Overcoming these barriers and maximizing the potential of AI in Uganda will need a collective effort. In this regard, enhancing capital expenditure in digital infrastructure, offering domain-specific skilling, and allocating increased attention to R&D (Research and Development). Beyond this, adapted government policies, effective public-private partnerships and the civil society are also essential to create an enabling environment for innovation and a sustainable AI-driven economic development. Through collaborative efforts alongside other industry players, Uganda can leverage existing challenges into opportunities for a future in which AI acts as a pillar for sustainable development and improved quality of life for all citizens.

AI is future — more accurately, AI is present — it's elevating its role significantly in every area of our lives. This technological revolution has major implications for the world economy, through new growth models, new forms of employment, and new ways of interaction between the traditional economic agents. AI is also a powerful driver of economic change, with its continuing evolution poised to upend the foundations of business activity and economic policymaking. The tsunami of change is enabled by a combination of advances in technology, availability of huge volumes of data, emergence of cloud computing — creating an ecosystem for innovation, and growth. So let's deeply discuss, the role of Artificial Intelligence in global economic development by its effects and chances to boost economic development and social progress.

AI is a catalyst for change in the Public Sector and the Public Private Sector. In the past decade, the development of AI has transformed from the models we were previously working with to a generative AI, which creatively explores data, modeling unique interpretations based on complex datasets. This progress creates new horizons in the public and private sectors. In the public sector, governments started incorporating AI to enhance services to citizens and to deal with workforce issues. From customization of administrative service to internal process streamlining, AI applications in public sector services pave the way for improved efficiency as well as citizen satisfaction. This might mean, for instance, AI chatbots (virtual assistants) delivering rapid and accurate answers to citizens' demands, thus enhancing their interactions with different administrations. A widely known successful use case of this type is the Amelia platform developed in France to answer citizens regarding administrative process. Similarly, Estonia's e-residency programme enables citizens of other countries to register companies and pay taxes online, leveraging AI for the process. On the private side, companies have also increasingly taken to AI on a massive scale to optimize operations, improve productivity and provide more bespoke products and services. Even the list of economic use cases for AI in the private sector is lengthy, with firms applying AI to everything from demand forecasting and inventory management to personalized marketing. For instance, businesses use AI to analyze customer data and predict what the customer will like, which allows them to offer more tailored products and services, thereby increasing their competitiveness in the market. Amazon, for example, employs artificial intelligence to suggest specific products to shoppers based on their buying and browsing behavior. That allows the e-commerce giant to suggest better products and drive sales.

Moreover, central banks have used AI to improve economic predictions and combat financial risks. For example, AI models assess millions of evidence at the same time, allowing financial institutions to paint what's going underneath with trends of the economy, and prepare ahead of a future activity of the market and other policies they make to be monetary.

Toward that, they've built a tool, akin to Athena that parses and interprets what is contained in regulatory documents and cross-references that with external data points from public media to provide regulators with richer context into banks and their risk profiles. This ability of GABI to fit and tune large regression models addresses the Big Data so that we can approach and

compare models in a domain that is richer and relevant. For network analysis, for example, NAVI creates graphs according to the relationships in the data.

Then users are able to see the sometimes complicated ownership structures of supervised banks and compare data from various data sources -to have an overview of holders and interdependencies.

One of its most common applications is education, where the elsewise strife in learning has been supported by the ineffable capabilities of AI. One major transformation it offers is personalized learning in which the A.I. system customizes the educational content according to the student ability and learning styles. It accelerates learning helps disabled learners and improves the overall gameplay of learning. AI also can help reduce learning inequalities by providing equitable access to education and bespoke learning experiences. Therefore AI based technologies can help overcome the socio-economic and geographical barriers that often restrict access to quality education. One another important contribution of AI is automating the administrative and repetitive tasks of the teachers. AI is already capable of taking care of tasks like grading assignments, monitoring student progress, and giving personalized feedback. These machines free teachers time from routine tasks and concetrate on more sophisticated parts of teaching, i.e, preparing customize curriculum and doing face-to-face interactions with students. Finally, the possibility to predict students' behavior and to optimize the entire process is one of the outstanding tools that AI allows us to use. Predictive analytics helps detect the students who are likely to quit the educational system and implement the early solution strategy. Moreover, AI helps students get ready for the challenges they will soon have to face by developing such significant skills as creativity and critical thinking they need in a changing world.

Artificial Intelligence has become a transformative element in various spheres of the global economy, bringing considerable benefits to actors in the financial sector, but also agriculture, medicine and defense. AI also taps into new horizons for the finance sector for its ability to secure assets and forecast market trends. Central banks are increasingly using AI to facilitate their monitoring and oversight activities. One such example is the Central Bank of Brazil, which has already created a prototype robot to classify consumer complaints against financial institutions using machine learning. For example, the Bank of Canada applies machine learning tools to improve the efficiency of its supervisory activities by identifying anomalies in regulatory submissions. AI can also identify financial risks, such as money laundering or anomalies in transactions. For example, the Innovation Hub at Bank for International Settlements (BIS) has deployed neural networks to detect trends and anomalies in transactions, such as identifying potential money laundering. Finally, one of the great things that we can have it through AI is that we can use predicting behavior in students and optimize educational processes. Similarly, from predictive analysis in educational systems, we can find the students who are at risk of dropping out so that early interventions can be made. Moreover, AI prepares the students for future challenges by acquiring life skills like creativity and critical thinking, which are essential to sustain in a dynamic ecosystem.

These initiatives show how AI will play a beneficial role in managing financial risk and securing transactions. Outside of finance, AI has also transformed food, health care, and defense. In agriculture it has helped in developing climate resistant varieties, providing data related to soil, guiding spraying drones to help with accurate spraying of fertilizers and pesticides. It helps global food security and alleviate hunger. In medicine, artificial intelligence is allowing for more precise healthcare, faster diagnoses, new treatment discovery and records management promising better patient high quality of life and clinical results. AI, for example, is being used to boost the productivity of retinal clinics so that more people can be screened for diabetes-related eye

damage. Lastly, in the field of defence, AI improves military surveillance and analysis of intelligence data, combat scenario simulation, operational efficiency, and decision-making in military operations. In Ukraine, for instance, we see that AI is being utilized for everything from strategic planning, to surveillance and monitoring of enemy position, to conducting attacks that are done through drones remotely or in autonomous mode. Additionally, it is critical to information warfare, where it is utilized by both sides to shape the already constructed narrative of the conflict and the public perceived image of the war.

AI is a huge technological shift with important potentially far-reaching implications for the nature of work and of economic production if it vastly increases productivity for the tasks that the workers perform. Routine and repetitive chores would be automated which should yield a productivity upside with workers freed-up to do more creative and innovative things. In this vision, AI augments rather than replaces workers by capturing tacit knowledge accumulated over time and embedding it into the work process. This ensures that humans and machines become symbiotes, allowing more and more workers to spend their time solving new problems, innovating and building the economy into a society of researchers and innovators. Harnessing AI also holds the potential to drive radical advances in medicine, science, and creativity. AI-driven algorithms can significantly speed up the process of discovering new drugs and uncover previously unreported patterns in human biology. And AI would even be able to help itself evolve, thus setting an upward spiral of constant evolution and progress

The correlation with artificial intelligence is not just in the field of economics. For the past 40 years, there have been countless experiments expanding when — and how — ordinary citizens can participate in policy and law. These efforts have typically been local and smallscale, encompassing citizens' assemblies, juries and other forms of direct participation. A report released by the Organisation for Economic Co-operation and Development in 2020 found nearly 600 instances of a random sample of citizens closely deliberating with one another over political issues to turn out informed recommendations or even specific proposals. Some of these initiatives also targeted mass participation, especially via participatory constitutional processes in several countries, and multi-format consultation campaigns. But we did this within a frame of great technological limitations and within limited capacity to digest citizens contributions effectively. But new technologies have emerged that can enhance and extend these deliberative processes. For instance, the province of Taiwan took a novel approach by launching a new digital tool called pol. is. This platform where citizens write down in detail their opinions on many matters and can also vote on the opinions of others uses algorithms to create a map of the landscape of opinion and identify points of consensus and divergence. More recently, Meta3 and other companies have explored how AI could enable largescale deliberative processes. In 2022, Meta launched the Meta Community Forums so that randomly selected groups of users can discuss issues, from regulating climate content to cyberbullying in the metaverse4.

It's quite certain that AI is going to change the world as we know it. At least that's what you hear about the different effects to work work it has, drags for higher 'employment displacement and efficiency' before all these going shit no, draws of a new nature from the work, a mass unemployment with permanent changes. According to a recent study conducted by the OECD (2023), 27% of occupations are in highly automatable occupations. This compares to other estimates that say about a quarter of tasks currently performed by people could be automated, putting at risk millions of jobs. Besides, the use of AI by technologists and business leaders has led to the immediate displacement of many kinds of human labour, driving stagnant or falling wages across many sectors. Generative AI is a new twist, creating text, images, and audio that used to be the province of the human creator. That ability takes automation to functions like customer contact and content writing, and threatens a broader swath of employment.

This shift comes with one of the biggest challenges: A growing income inequality among workers. Research from labor economics suggests that middle-tier job automation can lead to workforce polarization, where those with high income and those with low income widen the gap with each other. The effects of AI aren't limited to the labor market, they also exacerbate economic disparities. AI has a tendency to increase demand for highly specialized skills to a far greater extent than demand for general labor —much of which is unskilled—and to along the way also increase wage disparity.

Simultaneously, the increasing concentration of power in the AI market by major tech companies can potentially lead to the consolidation of economic power and misuse of regulatory tools. This type of consolidation limits competitiveness at the market level, and increases inequality by redistributing prosperity from smaller businesses and employees to the big kids on the block. Democracies have the ability to govern artificial intelligence for not only the bottom line -- but also what feeds into it -- in a fair and equitable way.

Industrial concentration has increased in developed economies since the 1980s — a trend that has only been accelerated by the adoption of A.I. Big Business with Big Money has quickly adopted AI for greater productivity and profitability, sometimes at the expense of smaller firms who cannot bear the high costs of developing and maintaining AI. Tech behemoths, such as Microsoft and OpenAI, have, for example, poured vast amounts of money into proprietary AI tech, which solidifies their market power even further. The large and asymmetric economic advantage these companies will have from network effects of data accumulation and resource underwriting is likely to persist even if AI costs fall over the next few years. Hence AI has been the game changer for big businesses and corporations against small business competitors. As large corporations leverage A.I. to streamline operations, small companies are falling behind in an economy fueled by innovation.

The other big threat to the productivity story is abstract automation. It definitely boosts average productivity by rendering processes more efficient, but tends to lower the marginal contribution of labor as machines increasingly do work that heretofore humans did. This divergence undermines the potential for shared prosperity. So when companies swap workers out for automated systems, they may gain cost savings and higher productivity but also increase economic and social inequality. We will require a balanced approach to explain the gains in productivity with equitable employment opportunities. Rather than simply automating tasks, businesses can develop strategies that extend workers' roles through new tools and skills. High-end software for automobile mechanics may be able to drive further productivity gains, while never wholly replacing the human touch. It offers a fair and responsible path to economic growth in an automating world.

The raft of other emerging technologies can also be misused, generating GenAI (generative AI) in particular can use to hijack narratives, with serious risks. For instance, whether in text, image or synthetic video form, AI-generated content can cater to pre-existing beliefs embedded in individual cognitive profiles, therefore reinforcing cognitive bias and information silos. The one dangerous piece is that it has a sense of reality to it and is part of a grotesque scale of AI misinformation. AI is entering the realm of politics, the stock market, and public sentiment with synthetic videos, like an episode from March 2022 in which the president of Ukraine appeared in chains, being handed over to Russian military officers, and this can have huge ripple effects. But even when misinformation is the result of algorithm error and not sabotage, the effects can be grave, affecting the political, economic and social fabric of countries around the world.

The increasing focus on Artificial Intelligence (AI) in Uganda and other sub-Saharan nations presents both tremendous opportunities and significant challenges.

This discussion addresses the challenges Uganda faces in advancing its AI capabilities and the opportunities that can fuel the socio-economic advancement of the country.

AI is an emerging key driver of economic change globally and Uganda is appreciating its potential for transformation. Many startups and new initiatives are underway, and the country is well on its way to adopting this revolutionary technology. By 2023, many nations had expressed and shown their readiness to slip AI into their socio-economic frameworks having had the political will, contributions to the requisite infrastructure and a growing pool of skilled professionals.

If a map is drawn of readiness for adopting artificial intelligence, most African countries will be the last according to the "Government AI Readiness Index 2023" compiled by Oxford Insights. The number one position is correlated among 193 countries and was determined through 39 indicators grouped under three broad categories are the domains of "Government," "Technology Sector," "Data and Infrastructure" and "Private Sector." The survey found the top three African nations were Mauritius, Egypt and South Africa, which are committed to enabling the growth of tech entrepreneurial ecosystems. Government intervention to allow progress in these countries has led to startups and industries endowed by AI. But there are vast disparities across the continent. Côte d'Ivoire, for example, was 19th out of 20 in 2018; Kenya placed 9th, Tanzania 18th, Rwanda 5th and Uganda 16th. This pervasive gap simply reaffirms the growing need for Uganda as a developing nation to deploy a holistic and well accelerated pathway to accomplishing its AI readiness, as well as bridging its technology ecosystem challenges.

AI is important part of some industries because it allows automation and improves performance, simplifies processes, and enhances accuracy. With the increased use of Artificial Intelligence (AI) in Uganda (and many other countries too), we can turn the tide around by reducing time and cost in other sectors such as agricultural and healthcare, and also contribute to innovation in new emerging sectors. That is when AI is cooperating with the five main actors (decision-makers, academia, big businesses, small & medium enterprises and multi-actor collaborations) in dynamic ecosystems. Be sure to stay involved in relevant trade or industry communities – these groups are critical to promote innovation, driving skills growth, and establishing the enabling conditions for AI adoption in multiple sectors.

Uganda has several challenges though that hinder effective AI integration and usage. From education, a basic necessity to get into the corporate world with the knowledge of AI tools, to infrastructure, a basic need to provide these tools to the people, from regulatory framework to set the goals of these tools and speed it up to structural inequity, these barriers are creating havoc in the way of framing the country through AI.

The adoption of Artificial Intelligence (AI) is constrained by structural inequalities (for example, unequal access to socio-economic and political resources) that impede widespread adoption. This slant is mirrored in unequal access to basic essentials–namely education, jobs, income, information and communication technologies (ICT), and health care. This inequality is further compounded in Uganda by digital divides that limit access to ICT. Eight contributing factors for the widening gap between those with access to ICT and those without include the absence of telecommunication infrastructure, patchy electricity supply in some areas, high prices of smartphones and lack of digital skills This means that many opportunities generated by AI are missing out for the people.

Limited network access in Uganda has also slowed down the adoption of AI in Uganda. Infrastructure and mobile connectivity is growing in developing countries, although progress is slow, and a large part of the population remains unconnected and without internet access. Moreover, the high cost of internet services and broadband hinders AI adoption тоже Thus, Uganda is much less able to fully exploit AI benefits due to structural inequalities and the digital divide. Not only does this impact the ability to access jobs, education, and health, but it also inhibits the government from using such technologies to enhance the quality of life of its citizens.

In AI adoption and readiness, Africa falls behind global regions. Africa itself was as late as a decade after the Fourth Industrial Revolution (begun in 2000) for AI startups to get going in 2021 and no African country made the top 50 for government readiness for AI. This while Uganda and the rest of the African continent are still playing catch-up in the global race of AI.

Artificial intelligence (AI) is a key area of research and development (R&D) worldwide that has brought about many technological, economic, and social innovations. However, Uganda's weak investment in R&D has suffocated AI innovation growth.

Yet, limited investment in R&D in Uganda has stifled growth in AI innovation. Such underinvestment is a significant barrier to the country's capacity to produce AI innovations that address local needs. Research and new application development are limited with both public and private financial resources. This means that Uganda that luck may outstrip falling behind in the global economy of AI in a way that can limit its long term economic growth. And as much as the need for AI skills and training is a critical driver for innovation in the country, the lack of these are one of the biggest barriers. This is made worse by the absence of sufficient AI R&D infrastructure within Uganda and Africa, which only limits the possibilities of collaboration and knowledge-sharing between local and international researchers. There is no dedicated artificial intelligence research hub and inadequate telecommunications and energy infrastructure slows the deployment of large-scale AI initiatives. And this limits AI impact, not just in Uganda but across the whole continent.

The emergence of AI in Uganda offers great potential, but it also comes with cracks. Uganda, faces hindrances such as structural inequalities and digital divides. Implementing all this requires a more comprehensive/inclusive approach to guarantee Uganda a place in the AI era and bridge the disparity with the rest of the world. To address these challenges, however, you know, it's going to require investment both in digital infrastructure as well as specialized training as well as R&D. Sound early-stage government policies and strong government-private sector-civil society partnership creates the right environment for innovation or economy-driving AI in addition. Uganda can partner with others to facilitate opportunities from the challenges through which to innovation in the process of achieving sustainable development country-wide and improved standard of living per citizen emerging from artificial intelligence.