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Role of Artificial Intelligence (AI) in Enhancing Impact Investing: A Review of Literature

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Abstract:
Impact Investing involves investments that generate both financial returns and positive social or environmental impact. Impact Investing has become a vital strategy in the financial industry due to its role in assisting in solving global challenges and promoting sustainability in every aspect of life. This strategy is now using Artificial Intelligence (AI), which is a "technology that enables computers and machines to stimulate human learning, problem solving, and other related activities".

This integration of AI and Impact Investing is changing the impact investing industry. Due to this fact, there is a need for measures to be put in place to address the challenges associated with it to make it sustainable. Therefore, the review helped to obtain a unified data on the benefits, risks, ethical considerations, and risk mitigation and regulation for policy makers and other stakeholders to put together measures in place for improvement and sustainability of the integration.

The review employed the five-stage method by Cooper to synthesize the literature on benefits, risks, and ethical issues, as well as risk mitigation and regulation, related to Impact Investing and the integration of Artificial Intelligence.

Keywords: Impact Investing, Artificial Intelligence Integration, AI Benefit, AI Risk

Introduction:

Our world today needs Impact Investing now, more than ever, due to the economic situation being faced all around the world. Impact Investing channels funds into solving pressing challenges like poverty, climate change, gender inequality, access to healthcare and education, among others. Enhancing this investment strategy to produce excellent results is very necessary. A key support to revolutionize the processes of impact investing to enhance its performance is Artificial Intelligence (AI).

Impact Investment, according to the GIIN, can be defined as "investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return". Impact Investing is differentiated from other investment strategies based on these three (3) fundamentals: Intentionality, Financial return, and Impact measurement (GIIN, 2022). Artificial Intelligence (AI), on the other hand, can be defined as machines that are built to simulate human thinking and the ability to solve problems (Stryker & Kwavlskoglu, 2024).

Impact investing is still in a nascent stage and is still growing; due to this fact, AI integration is slowly taking root in the impact investing industry (Burns & Brakel, 2024).
Even though Impact Investing has benefited enormously from integrating with Artificial Intelligence (AI), there are a number of risks and ethical issues serving as a threat to the successful integration of these two fields. Currently, there is no existing literature on the

benefits, risks, and factors to mitigate the risk of the integration of AI and Impact Investing. Therefore, the objective of the review is to search for literature on the benefits, risks, and risk mitigation of Impact Investing and AI integration and synthesize the literature to get a unified dataset on the benefits, risks, and risk mitigation to help with measures to be put in place to make it sustainable.

To help achieve the objective of the review, the following research questions guided it:

- What are the benefits of the integration of AI and Impact Investing?
- What are the risks and ethical issues associated with the integration of AI and Impact Investing?
- What are the various risk mitigation and regulations for the AI and Impact Investing integration?

Literature Review:

The synthesis of the existing literature on AI and Impact Investing was conducted under various themes, including the benefits of AI to Impact Investing, AI investment in positive social impact, AI risk and ethical considerations, and AI risk mitigation and regulation. A gap was found where there is a non-existence of synthesized literature on the various research that has been carried out on the benefits, risks, and risk mitigation of the integration of AI and Impact Investing. This review will address the gap in the literature by synthesizing the literature to cover the benefits, risks, and risk mitigation of AI and Impact Investing. The findings of the review will be presented in the results session.

Methodology:

To be able to address the research questions, the researcher conducted a research synthesis. A research synthesis can be defined as the "unification of a particular set of literature review characteristics". (Cooper & Hedges, 1998). Harris Cooper drew an analogy between research synthesis and primary research. The literature review for this study was done with the help of the five-stage method for synthesizing literature. The stages are as follows:

- Problem Formulation
- Literature Search
- Data Evaluation
- Data Analysis
- Interpretation of Results

The procedures above helped in formulating the research problem, data collection, evaluating if the data fit the criteria, analyzing the data received, and finally interpreting the results from the data.

Formulating the problem: The research problem is that even though Impact Investing has benefited enormously from integrating with Artificial Intelligence (AI), there are a number of risks and ethical issues serving as a threat to the successful integration of these two fields.

Data Collection: The objective of the data collection is to find articles on the benefits, risks, and risk mitigation of AI and Impact Investing from 2015 to date. The keywords used included AI and Impact Investing benefits, AI and Impact Investing risk, and AI and Impact Investing risk mitigation.

Data Evaluation and Analysis: The fourth and fifth methods of Cooper's method of synthesizing literature are evaluating and analyzing the data found from the search. Only

articles that have to do with the benefits, risks, ethical considerations, and risk mitigation and regulation were included in the study; the ones which does not have these criteria were excluded because they have nothing to do with the three main research questions of the review. The review considered only articles that helped to answer the three research questions. The method described by Coooper (1998) was able to adequately guide this review. The table below shows the citations of articles included in the results section. Some of the articles were cited in all three themes.

Table 1: Citations of Articles found relating to the Research Question

Theme relating to the research question	Citation
Integration of Impact Investing and AI Benefits.	Burns & Brakel, (2024) Sutiene, et al. (2024) (Brozovic, 2019) (Tamura, 2024) (McKinsey Global Institute, 2018)
Integration of Impact Investing and AI Risks and Ethical Considerations.	(Tamura, 2024) (Barocas & Selbst, 2016) (Acemoglu & Restrepo, 2020) (IMF, 2024) (Burns & Brakel, 2024) (Haenlein & Kaplan, 2019)
Integration of Impact Investing and AI Risk Mitigating Factors	(Burns & Brakel, 2024) (Brown, 2021) (Tamura, 2024) (Kurshan, & Chen, 2020) (Haenlein & Kaplan, 2019) (Sutiene et al., 2024)

Results:

The findings were categorized into themes and presented below:

Integration of Impact Investing and AI Benefits

Facilitate Investment Process and Procedures: AI analyses data faster than humans; it does not attach personal bias, and it's consistent. Data-driven decision is more effectively made with AI than by humans. The frequent functions played by AI in impact finance and for finance in general are screening investment decisions, equity funding, and accelerator candidates (Burns & Brakel, 2024). A large amount of data, which poses a challenge to investors and is difficult to analyze by human capacity and expertise, is effectively handled by AI. This can analyze extensive datasets rapidly, generate patterns and trends that represent "solutions or valuable information not visible to human scrutiny". This benefit enhances the quality of investment decisions (Sutiene et al., 2024). The aspect of AI that accomplishes this is machine learning, which the algorithms can analyze vast datasets to uncover the trends and patterns that are not visible to the naked eye of an average investor" (Brozovic, 2019).

Social, Economic, and Environmental: The impact generated by the three (3) main components of impact investing is also influenced by AI. These are social, environmental, and financial impacts. One key area AI influences social impact is the "labour market, where AI's ability to automate tasks could lead to both job displacement and the creation of new employment opportunities in fields such as data science and AI engineering". Other social

impacts that are also influenced by AI can be seen in healthcare, education, transportation, and entertainment, among others. For instance, AI's applications range from developing “precise diagnostic tools, personalized learning programs, self-directed vehicles and custom-made entertainment solutions” (Tamura, 2024).

AI innovation in products and services, automating processes, and enhancing efficiency in services such as medical treatments, personalizing marketing strategies, and streamlining manufacturing processes can significantly improve the economic impact. Sophisticated models and systems are supported by AI, which aids in climate change accurate prediction, affecting the environmental impact favorably (Tamura, 2024).

AI Investment in Positive Social Impact

AI can be integrated into the various social areas below to boost its impact.

Crisis Response	Disease outbreak Migration crises Natural and man-made disasters Search and rescue
Economic Empowerment	Agricultural quality and yield Financial inclusion Initiatives for economic growth Labor supply and demand matching
Education	Access and completion of education Maximizing student achievement Teacher and administration productivity
Environment	Animal and plant conservation Climate change and adaptation Energy efficiency and sustainability Land, air, and water conservation
Equality and Inclusion	Accessibility and disabilities Exploitation, Health, and Hunger Marginalized communities
Health and Hunger	Accessibility and disabilities Exploitation, Health, and Hunger Marginalized communities
Information Verification and Validation	False news Polarization
Infrastructure	Energy Real estate Transportation Urban planning

	Water and waste management
Public and Social Sector	Effective management of the public sector Effective management of the social sector Fundraising Public finance management Services to citizens
Security and Justice	Harm prevention Fair prosecution Policing

Source: McKinsey Global Institute analysis

Risk and Ethical Consideration

Poor Regulations and Standards: AI deployment is very rapid, and regulators of the industry cannot keep up with it to develop corresponding regulatory frameworks, which leads to gaps in governance that pose a major risk in AI integration. These risks can be seen in privacy, security, and ethical standards issues. The absence of stringent regulatory oversight can lead to situations where AI systems are deployed in ways that can have unforeseen negative impacts on society. This includes "surveillance overreach, data privacy breaches, and the potential for AI-driven systems to be used in manipulative or coercive contexts." AI predominantly makes use of data for analysis and interpretation. The principle "garbage in, garbage out" holds for AI; this poses a risk for working with AIs. This makes it very necessary to emphasize the importance of high-quality input for successful outcomes (Tamura, 2024).

The ethical issue associated with AI automation has to do with bias and fairness. Mostly, the Algorithms being used to train AI models sometimes contain biased information, and these AIs are as objective as the data fed into them. For instance, research shows that self-driving cars can easily identify lighter skin than darker skin, which is due to the data used to train the AI that detects it (Haenlein & Kaplan, 2019).

Barocas &Selbst (2016) discussed "how data mining and automated decision-making can reinforce existing inequalities by encoding prejudices into algorithmic systems, thereby affecting decisions in employment, healthcare, and criminal justice". Based on these studies, it is understood that the misuse of any AI tools and methodologies with any prejudiced or biased information fed into the system will affect its analysis and interpretation in its operations. For instance, if AI is not monitored, it can make decisions that will be unfair and disadvantageous to a group of people based on race, gender, and socioeconomic status. On a larger scope, wrong use of AI may "compromise national security, economic and political stability and labour market balance, (Tamura, 2024).

Labour imbalance: This can be seen in AI-driven automation, having both a positive and a negative effect on the labour force. It increases productivity and operational efficiency on one

hand, and poses as a threat, displacing many of their jobs. A study conducted by Daron Acemoglu and Pascual Restrepo revealed that the rise in AI automation in various sectors has led to considerable negative effects on employment and wages (Acemoglu & Restrepo, 2020). This is being seen in the areas of impact investing and integrating AI automation. They argue that each AI automation replaces approximately three workers, and this automation has aggravated the plight of jobs that can easily be replaced by AI automation. This is emphasized further in a report by the IMF in 2024, which states that AI is replacing and complementing about 40% of existing jobs, which even intensifies in advanced economies, affecting up to 60% of jobs (IMF, 2024). There are several roles in impact investing processes which cannot be replaced by AI, such as relationship-based: "coaching, advising and making introductions to other advisers, potential partners and funders ". Roles like human-to-human work can never be replaced by AI (Burns & Brakel, 2024).

Long-term Societal Impact: Risk associated with AI can also be in the form of "Long-Term Societal Impacts". The long-term societal impacts of AI are deep and complicated. The effect of long-term integration of AI into society will have some risks associated with it, which will have an influence on social norms and human behavior, including everyday life. "The potential for AI to influence public opinion, manipulate information, and reshape the political landscape presents challenges that require careful consideration and proactive management" (Tamura, 2024)

AI Risk Mitigation and Regulations

Transparency of Data set for AI: For AI integration with impact investing to achieve some amount of success, the risk associated with the system has to be mitigated. This can be achieved through supervising the system with relevant regulations and other mitigation tools and decisions. A key mitigating factor of the risk is the transparency of the AI tool. AI providers should be transparent about the modelling, datasets, assumptions, and limitations embedded in their tools, which should allow users to set and use their own parameters. The dataset embedded in the model should not be based on a faulty evaluation system. Outstanding frameworks that have stood the test of time should be used as a basis for deploying AI for the impact industry. For example, the framework of Village Capital (a non-profit organization that supports early-stage companies) in bias evaluation reduction, which is based on a two-year study of experimental and control groups across eight accelerators, can be used as a basis for modelling an AI tool for data collection (Burns & Brakel, 2024).

Particularly, machine learning success is heavily dependent on the quality of the training dataset. The dataset assists in forecasting various scenarios and solutions (Brown, 2021). Developers can adjust the model and parameters to refine outcomes over time. (Tamura, 2024).

Labour Upskilling and Reskilling: Another way to mitigate AI risk is empowering people with the requisite skills and expertise in the impact ecosystem to have a deep understanding of how AI can integrate impact Investing processes efficiently. (Burns & Brakel, 2024).

Harmonization of AI Regulation: To avoid regulatory infractions, AI integration should be done sustainably. The technology has gone ahead of the current regulations, making it difficult to work effectively (Kurshan & Chen, 2020). A number of financial organizations are publishing standard, conceptual frameworks, and regulations to govern AI-powered risk issues. For example, the "draft EU regulatory framework on AI known as the AI Act" and the Artificial

Intelligence Public-Private Forum by the Bank of England and the Financial Conduct Authority also published their report. There will be much success achieved in this area if all these AI-related regulations and standards are harmonized (Sutiene et al., 2024).

Discussion:

This is the section where results obtained from the review were illustrated and explained on how they can address the research questions. This review was conducted to bring together the data on the benefits, risks and ethical considerations and risk mitigations, and regulations to provide a unified knowledge to be able to address the following research questions:

- What are the benefits of the integration of AI and Impact Investing?
- What are the risks and ethical considerations associated with the integration of AI and Impact Investing?
- What are the various risk mitigation and regulations for the AI and Impact Investing integration?

In terms of the benefits of Impact Investing and AI Integration, several data points were found that show AI has brought enormous benefits to Impact Investing. For instance, in Investment processes and procedures, AI has helped in a number of interventions. According to Burns & Brakel (2024), AI analyses data faster than humans and consistently, and more so, it is effective to perform data-driven decisions with AI than humans. In addition, it is impossible for humans to monitor effectively all the activities of AI (Sutiene, et al., 2024).

From the review, it was seen that impact investing is benefiting greatly from AI in the area of Environmental, Social, and Financial. The impact created by these sectors is being positively influenced by AI, such as automating processes, innovation in products and services, and efficiency in services.

AI improves the efficiency of social services and amenities, which brings to light the various social areas of impact investing in which AI has been integrated (McKinsey Global Institute, 2018). In terms of the benefit AI brings to impact investing, the economic side has to do with innovation in products and services, which significantly improves the economic impact. With the environmental side integration of AI, it has brought about Sophisticated models and systems used environmentally, such as climate change accurate prediction (Tamura, 2024).

The second research question, which has to do with the Risks and Ethical issues, is addressed as well. The integration of AI and Impact Investing is not without challenges and risks associated. The review revealed that AI deployment is at a fast pace that the development of regulations and standards to govern the risk issues associated with it cannot keep pace, thereby creating a gap that presents risk. It also revealed an ethical issue that data fed into the AI model can be influenced by bias and prejudice, which can create decisions that are unfair and disadvantageous to a group of people, such as race, gender, etc. (Barocas & Selbst, 2016). Another issue has to do with labour issues created by AI. AI creates jobs through innovating products and services, and on the other hand, causes job losses through automation, which poses a risk. (Acemoglu & Restrepo, 2020)

The review also revealed a long-term social impact that might pose a risk if not managed well. This has to do with AI influencing our everyday life, which in the long term can manipulate information, influence political issues, and affect social norms. (Tamura, 2024)

The findings from the review addressed research question three, which is concerned with Risk mitigation and Regulations. The findings from the literature revealed several factors to consider to mitigate some of the risk and ethical issues identified. The various regulations and standards

on AI risk published by several organizations should be harmonized to have a common one that will be recognized by all to govern AI risk-related issues (Sutiene et al., 2024). AI developers should be transparent about their dataset, assumptions, and limitations embedded in the AI model. Data fed into an AI tool should be free from bias and prejudice, it should be accurate, and continuously revise the data to meet the changing needs of society. (Burns & Brakel, 2024). Continuous capacity building to give the right skills for both AI and impact investing for effective integration. Upskill and reskill people to avoid job losses created by AI automation (Burns & Brakel, 2024).

Conclusion:

The review has brought to bear several benefits of Artificial Intelligence to Impact Investing, such as facilitation of investment processes and procedures, efficiency in environmental, social services, and amenities, and innovation of products and services.

It also revealed the risks and ethical considerations associated with integrating AI with Impact Investing, and these can be seen in poor regulations and standards, labour imbalance, and negative long-term societal impact. Also, various risk mitigation and regulation of the integration were found, such as harmonization of AI risk regulations and standards, transparency in AI data sets, and the data fed into AI should be revised regularly to meet changing trends, upskill and reskill to avoid job losses, and capacity building in Artificial Intelligence.

This synthesized literature will therefore provide a unified view on the benefits, risks, and ethical issues, as well as risk mitigation and regulation, to policymakers and other stakeholders, helping them to identify measures to be put in place for the sustainable integration of Impact Investing and Artificial Intelligence. It is recommended that more research in the area of AI and Impact Investing be conducted to bring new knowledge. Further research into "How AI can measure the impact of a project or enterprise that has multiple ripple effects" should be conducted.

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