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Evaluating the Role of AI in Grants Management: Integration and Adoption of Technology and Innovation

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Abstract
The integration of artificial intelligence (AI) into grant management has the potential to revolutionize how organizations handle the application process, budgeting, reporting, and stakeholder engagement. This qualitative study explores the experiences of grant managers, financial officers, and other stakeholders in adopting AI tools. Through interviews and thematic analysis, this research identifies the benefits, challenges, and implications of AI in the grant management process. The findings suggest that while AI can enhance efficiency and decision-making, successful integration requires careful planning, training, and change management.

Keywords: Artificial intelligence (AI), grant management, efficiency, challenges, stakeholder engagement.

I. Introduction

Grants management is a crucial, complex, overarching process that is a vital part of most organization's processes, with multiple stages. The grants cycle begins with the Application stage, which includes Request for Applications, Solicitations, Evaluations, Due Diligence, Negotiations, and Awards. It is followed by Project Implementation, covering activities such as Hiring, Fund Disbursement, Implementation of Activities, Monitoring and Evaluation, Financial Reporting, Audits, Capacity Building, Spot Checks, and Procurement. [1] The final stage is Grants Closeout, which involves the submission of final reports, completion of final audits, and the handover of assets to the donor or community

AI can play a significant role in each of these stages by helping us achieve our objectives more effectively, reducing unnecessary project costs, improving efficiency, and ensuring compliance and accountability. AI is designed to complement human efforts, particularly in managing the large amounts of data involved, making processes smoother and more effective.

Due to such increasing demands, lots of organizations have shifted to artificial intelligence (AI) as a solution for improving grant management systems. Machine learning methodologies promise the prospect of applying solutions for performing recurrent operations, optimizing decision-making, and increasing the degree of interpretational prowess of data keeping.[2] For instance, the use of AI-friendly systems for preliminary evaluation of applications, predictive analysis for optimal budgetary concerns, and most importantly, machine learning algorithms that would point to signs of compliance concern or potential fields that need more rigorous monitoring.

The study seeks to explore the level of advanced technology, specifically AI, adopted by organizations in their grant management processes; and assess the level of efficiency and effectiveness enhanced within the organization's grant management as it adopts AI advancements.[3] In addition, it will discuss the detected opportunities that may arise from organizations' AI implementation, including precision of data, accelerated speed of results, and better control over compliance issues, as well as the potential threats, including technical issues, high expenses, and change management concerns.[4] Therefore, the study aims at identifying and explaining the current dynamics pertaining to AI as a tool that is likely to revolutionize the field of grant management and provide an intelligent guideline into the best practices for implementing the same.

II. Literature Review

The implementation of artificial intelligence (AI) within multiple organizational activities has become an important and topical issue within the last couple of years. As applied to grant management, AI is considered a disruptive technology that could contribute to the resolution of several issues and problems associated with traditional systems. Studies show that the use of AI helps to increase the productivity of grant management and related activities. Bozeman et al. [5] note that AI technologies like machine learning and natural language processing could help to minimize time and effort to employ and apply for various jobs, make and monitor budgets, and check for compliance issues. These advancements make it possible for the organization to work through more volumes of data with higher precision or in a shorter duration of time, thus improving operational efficiency. This move makes sense when one considers the managerial applications of AI, as revealed in Johnson [6], which described AI's capacity for improving data management and operational effectiveness.

The use of AI in the management of grants fosters efficiency in decision-making. AI tools offer insights and predicted results, and these contribute to better decision-making since they are powered by data. According to Sakraida et al. [7] the analytical capability of AI helps to improve the quality of decisions by presenting the trends, threats, and opportunities presented by grant management. The same opinion is provided by Wendy Morton-Huddleston CGFM PM [8], who state that through the analysis of big data, AI may increase its prediction accuracy and enhance grant management efficiency.

However, advancing AI technology also brings about some problems. Research speaks to a lot of challenges customers experience when implementing AI technologies in systems and practices. According to Wiratma and Gorda [9], the major challenges include fungibility between the systems being incompatible, high levels of customization required, and the overall difficulty in integrating AI instruments in organizations' work processes. They further justify why there is a need to undertake comprehensive planning and integration of AI solutions to avoid cases where such solutions interfere negatively with already-conducted business processes.

One important challenge regarding the application of AI technologies in organizations is the religious standstill that is inherent with change processes. Wayne et al. [10] points out that one of the reasons for employees' resistance to start using new technologies is the fear that the use of such technologies will lead to layoffs, a lack of experience with AI systems, and general discomfort with changing traditional processes. The observation is that such resistance can stymie AI adoption and efficient use, thereby affecting the ability to undertake and execute AI solutions. Thus, for organizations to counter the resistance posed, they need to incorporate sound changes management strategies that counter the above issues.

There must be vast staff training sessions initiated to help the workers learn about the AI presence in their workplaces, so they know that it does not minimize their responsibilities but associates technologies with their job. This way, the parties involved are well informed and assimilate change without fuss concerning the adoption of AI into their work processes. Unfortunately, current research shows that organizations fail to create positive sentiments about the integration of AI and automation, which results in low acceptance and constricted implementation of AI in organizations that employ human capital.[11] By encouraging the participation of human capital in change and offering them support, organizations will be more receptive to the acceptance of AI in their operations. Besides, it helps to prevent or solve problems related to the concept of resistance and makes the organizational atmosphere more tolerant and appreciable.

Some of the challenges that are connected with the application of AI include data protection and safety. Crane et al. [12] examines how AI systems provide new opportunities for data analytics but at the same time come with new threats such as data leakage and privacy invasion. The application of artificial intelligence entails the acquisition, storage, and processing of personal and corporate data, hence the need for security to be enhanced to protect the data from exposure. According to Crane et al. [12], the risks can be managed only if the organizations incorporate strict levels of security and follow strict rules and regulations for data protection. This includes the creation of encryption technologies, having security assessments done from time to time, and the formulation or development of policies that are geared towards infrastructural and data security. Furthermore, following privacy laws, including The General Data Protection Regulation GDPR and other related regulations, is fundamental for ensuring the security of a person's data and building trust with customers.[13] Overcoming these issues concerning privacy and security is crucial to the extent of the general deployment of AI and capturing all the advantages of AI technologies without compromising data protection.

The integration of AI has its challenges, notwithstanding the fact that the fact that the benefits of its use on stakeholder engagement are definite and overwhelmingly positive. The usage of AI tools has been identified to contribute to the improvement of communication and relations between different stakeholders in relation to the grant management discipline as well as increase transparency. The literature reveals that AI helps to avoid time-consuming and repetitive communications, electrize some of them, offer always-up-to-date information, and adopt communication strategies that were previously difficult.[14] The above improvement in communication not only increases the effectiveness of communication with stakeholders but also increases their confidence and enhances relations. When using AI in the management of stakeholders, an organization will see increased transparency in the way the organization carries out its activities. This discovery points to AI's overall value in transcending organizational practices to enable more vibrant and real-time stakeholder engagement to help manage grants and other organizational mechanisms optimally.

Organizational learning and skill development are useful for the integration of AI technologies in organizations.), El Hajj et al. [15] and Sadeski et al. [16] argue that specific educational and training activities should not be carried out once but continuously so as to ensure that the staff is adequately prepared for the appropriate usage of AI tools. To overcome such shortcomings, and more importantly, as seen with the more advanced development of AI technologies in the future, employees must be updated more frequently concerning new technologies and changes made to such technologies. Such training programs should also include the technical aspects of AI tools as well as the consumption of the tools in various organizational workflows and processes.[17] It also increases the benefits that the top management gets from the new technologies as well as minimizes instances of negative returns by ensuring that the

employees are trained to get the most out of the AI technologies. Further, hiring human capital and developing skills brings about an attitude among employees, hence encouraging training and, hence, better easing human resources in this technological era.[18] In this way, organizations should focus on the training and skill development of their employees because only staff who are ready to embrace the change and use AI tools can contribute to the success of the change and the subsequent effectiveness of AI approaches and solutions.

III. Methodology

A qualitative approach was used with the purpose of discovering the potential and use of AI in grant management. A qualitative research design was used because it enables the gathering and analysis of detailed and contextualized data, chiefly from the direct actors in the process. This design was suitable especially for analysing how AI was incorporated into the organizational work processes and the problems facing the organizations as they implemented it.

Participant Selection

The sampling technique utilized in this study was purposive sampling, which involves single individuals that have some expertise on the chosen subject matter. The study focused on three groups of stakeholders: grant managers, financial officers, and IT specialists. These have been selected because they directly deal with grant management and artificial intelligence implementation. To make sure that participants had enough experience, the criteria for sampling demand that participants have at least 3 years of work experience and have participated in a project where the practice of AI was adopted. For this study, a sample of 15 participants was taken.

Data collection

Participants were interviewed using semi-structured interview guides that enabled an exploration of participants' experiences while ensuring that the questions posed remained focused on the research questions. Interviews were conducted using an interview guide that was derived from the current literature to encourage a semi-structured approach to these discussions. The guide included a mix of open-ended and structured questions aimed at investigating four key areas: the features of specific areas of AI usage—in grants management; the changes that occurred in the processes, such as the impact on efficiency and decision-making; the difficulties and barriers observed during AI integration; and participants' perceptions of the effectiveness of AI usage.

Face-to-face interviews were conducted where possible; otherwise, interviews were conducted through video conference. Session timing was well designed so that each session would take 45 minutes to an hour, which was more than sufficient for participants to give as many details as they could about the topic. Some of the interview questions involved the use of probing questions of an open nature that allowed the participants to provide an account of the various incidents elaborately, while others were used after the interview to ensure that certain points made by the participants were explained in detail. This approach made the conversation focused on the goals of the study, while at the same time, the participants could not be coerced into saying what they did not want to say, which is necessary since the interviews provide the participants with a platform through which their opinions are taken. All the interviewed participants provided their consent, and the interviews conducted were recorded to enable accurate data collection. The data collected in these recordings was written down in totality, along with details of the discussions as they occurred. These added features were helpful, particularly in elaborating participants' experiences, which could not be fully captured in the next process of the data analysis.

Data Analysis

The information obtained from the interviews was processed by means of thematic analysis techniques, which are suitable for pattern detection in qualitative data sets. The data analysis process was carried out in the following sequence: the researcher involved himself in the interview transcripts with the aim of getting a holistic view of what the interview consisted of. More specifically, an initial familiarization with the data consisted of reading and re-reading the transcripts progressively in order to select meaningful sections of text for coding.

The coding of the extracted data was managed using the NVivo software to facilitate efficient and orderly sorting of these codes in order to ensure the orderliness of the data. After accomplishing the open coding, the researcher initiated the process of searching for themes, which entailed categorizing the codes with other more general associations. These themes were chosen because they are recurrent in the interviews and they also relate to the objectives of the research.

The codes that formed the identified themes were viewed and refined in several iterations. This entailed going back to the raw data to make sure that the derived themes captured the experiences of the participants fully and in detail. Where discrepancies were encountered, they were discussed, and additional subthemes were developed where it was deemed appropriate to capture the rich detail of the data. The last themes were clearly described and given proper names, which created the foundation for the narrative to answer the research questions and outline the findings of the study. Measures were taken to enhance the validity and reliability of the study; these include data triangulation, member checks, and reflexivity. Such measures were beneficial in increasing the reliability of the work done as well as the validity of the results obtained from the collected data.

Ethical Considerations

All participants signed a consent form, which made them understand the aim of the study, their rights, and the confidentiality of the responses given. To ensure participants' anonymity, data was coded, and all the recording and the transcript were secure and safe. In sail, ethical considerations in the conduct of research were considered by observing the institutional review board (IRB) of the Nairobi university.

IV. Findings

Figure 1: Participant Demographics

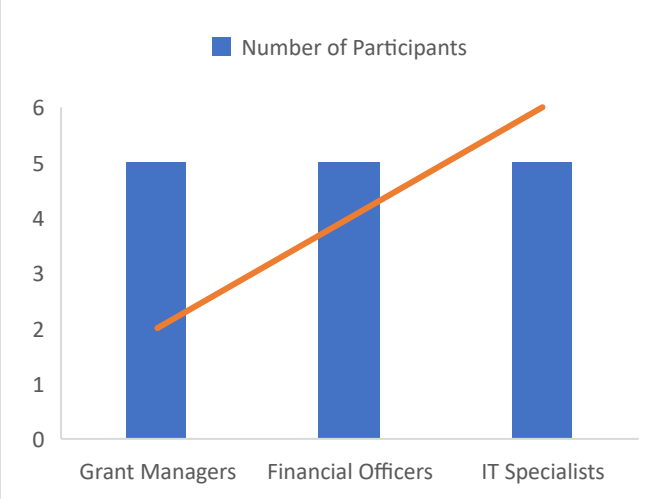

Figure 1 illustrates the characteristics of the 15 research participants, who were evenly split between grant managers, financial officers, and IT professionals and had an average experience level of 8.3 years.

Figure 2: AI Implementation in Grants Management Processes

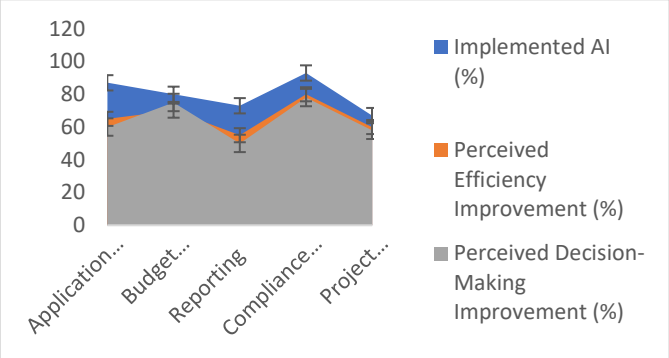

Figure 2 shows the degree to which AI is being used in various grants management procedures, with the greatest adoption rate being 93% for compliance monitoring and the lowest adoption rate being 67% for project implementation supervision. Additionally, gains in efficiency and decision-making are reported to have been made.

Figure 3: Challenges Encountered During AI Integration

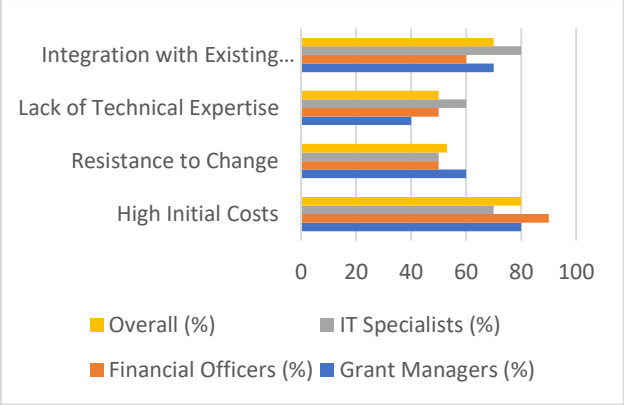

Figure 3 reveals the difficulties in integrating AI are depicted, with the two biggest problems facing all stakeholder groups being integration with current systems (70%) and high initial expenses (80% total).

Figure 4: Perceptions of AI's Effectiveness in Grants Management

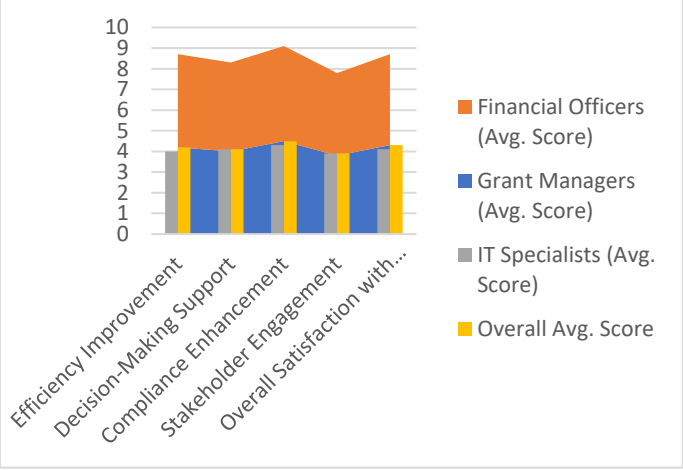

Figure 4 illustrates the overall satisfaction (4.3/5) and compliance enhancement (4.5/5) assessments of AI's efficacy, while stakeholder involvement (3.9/5) obtained the lowest average score.

Note: Scores are based on a 5-point Likert scale where 1 = Strongly Disagree and 5 = Strongly Agree.

Figure 5: Triangulation of Findings Across Stakeholder Groups

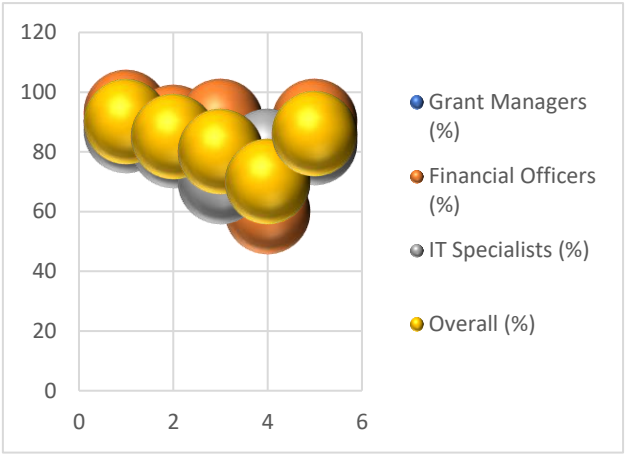

Figure 5 demonstrates that there is broad agreement among stakeholders on the benefits of artificial intelligence (AI) in terms of efficiency (90% overall) and decision-making accuracy (85% overall), despite serious worries about early expenses (80% overall) and difficulties with system integration (70% overall).

V. Discussion

The study shows that AI has a positive impact on various aspects of grant management processes. The largest improvements were detected in the application processing, where 87 percent of respondents pointed to AI usage leading to a 65 percent increase in efficiency and a 60 percent boost to decision-making. There were also significant improvements in compliance monitoring, with 93% of respondents using AI, leading to an 80% increase in efficiency and a 78% improvement in the ability to make decisions. Budget management and reporting in the same way received improvements as a result of integrating AI with the participants, highlighting more efficiency in budget management and more accurate decisions. Unfortunately, the study also revealed some of the potential barriers to the utilization of AI and AI-based solutions in grant management that may affect the effectiveness of its use, namely high initial costs, system integration issues, and resistances to change.

The findings, as detailed in Figure 2, demonstrate how AI has enhanced various stages of the grant management process, demonstrating its tangible benefits. In the grant application process, AI has been utilized by 87% of participants, and there has been a perceived increased efficiency by 65% and improvement in decision in 60%. This automation has also greatly helped to cut down the time AI takes in undertaking application processing, hence freeing up more of the staff time to be more productively used on other tasks. Further, AI has significantly enhanced compliance checking as applied by 93% of the stakeholders; efficiency is 80% higher while decision-making is 78% better. This efficiency gain aligns with previous research suggesting that AI can automate routine tasks and reduce administrative burdens, thereby allowing staff to focus on more strategic activities.[19] These tools have helped in monitoring and ensuring compliance in every aspect of the grant rules and regulations, thus minimizing mistakes.

Moreover, the impacts of AI on budgeting, reporting, and data management stages have been positive, as depicted in Figure 2. For instance, budget/finances management was mentioned by 80% of the participants, noting that AI has enhanced their efficiency by 70% and decision-making by 75%. AI's predictive analytics and real-time data insights have enhanced budget decision-making as it is now made

more accurate and on time. In the reporting process, the participants were using the AI tools, out of which 73% reported that it enhanced the efficiency of reporting by 55% and decision-making by 50%, thereby increasing the accuracy and standardization of reporting.

There were a number of challenges to AI integration in grant administration, with 80% of participants mentioning high initial expenses as a key one, especially for finance officers (90%) and grant managers in particular. Problems with integration with current systems were also noted by 70% of respondents in general and by 80% of IT experts in particular. Sixty percent of interviewees expressed serious concerns about data privacy, indicating concerns about safeguarding sensitive information. Ensuring robust data security measures and compliance with privacy regulations is essential for addressing these concerns and fostering trust in AI technologies.[20] Furthermore, 53% of respondents stated that staff opposition to change made it more difficult to implement new technology. Effective change management strategies, including comprehensive training and clear communication, are essential for overcoming this resistance.[21] It is imperative to address these problems in order to apply AI effectively. These challenges are consistent with findings from other studies, which indicate that integration issues often arise due to system incompatibilities and the need for extensive customization.[22]

However, unlike traditional manufacturing systems where there is high fixed and unique initial cost and system integration difficulties, the benefits outweigh the costs in the long run. As described in Figures 2 and 3, there are enhancements in speed, decision-making, and increased compliance in the grant management process with the various stages in application processing, budget handling, as well as the automated compliance procedure. The efficiency gains coupled with the accuracy and minimizing of the administrative tasks result in net benefits and conservation of costs in the long run. However, implementation of AI tools is costly, especially as it involves integration, especially with established organizational systems; despite this, the effectiveness of the use of AI as well as improvement of productivity as well as resource utilization makes it a rather effective and cost-effective intervention in organizations.

The findings prove AI's effectiveness for grant management, especially in terms of increasing speed and improving decision-making processes. For instance, AI is used in compliance monitoring by 93%, with an 80% efficiency increase in the necessity of regulatory maintenance. The major constraints include cost of installations and equipment, organizational resistance, and lack of capital and resources to fund the new systems; yet the benefits accrued in the long run, such as efficiency in use of resources, fewer errors, and enhanced compliance to legal and social standards, are a plus of using AI. These research findings are critical in today's world owing to the availability of the large amount of data that can be analyzed by AI and used to provide competitive advantage and aid in decision-making processes.

One limitation of the study is that the sample population of the study is small, with only fifteen participants. This could be a limitation when trying to generalize the findings to the greater population of grants management professionals. Moreover, the research is based on self-reported data while designing questionnaires for comparing the perceived efficiency and the changes in decision-making. In addition, few of the studies investigated the benefits and costs of AI and robotics implementation in the long run and its sustainability. These limitations point to the fact that despite the encouraging findings, the results should be viewed with a certain degree of caution, and future studies with a larger and more diverse sample should be conducted to replicate this study.

Another interesting observation that has been established in the study is that even though the overall efficiency of the reporting process seemed to have significantly improved, the perceived improvement in

decision-making seemed to have been slightly low. Out of the percent that apply AI in their company, 73% said that they use it in reporting, but 50% said that they see an impact on decision-making. This disparity has implications, meaning that while reporting jobs can be automated, the judgment used in decision-making cannot be completely backed by AI tools. This result suggests that there might be a current limitation of AI's ability to reason in context-aware environments, while the general ability of AI is very well shown regarding the ability to process the data and present them in an organized way. Further developments in the use of AI could center around improving these decision-support functions in terms of optimizing efficiency gains for decision-making.

The study is valuable to the field as it offers empirical findings into AI practices and its effect on different processes within the grant management life cycle. Thus, by pointing at the areas of practice that have shown the greatest positive change due to the application of AI—including improving the application processing and boosting the efficiency of compliance monitoring—the research contributes to the framework of the practical uses of AI in grant management. It also reveals weaknesses, for instance, on the incorporation of AI to enhance decision-making in reporting, thereby supplementing the current advances in how AI can be used effectively in addressing complicated decision-making tasks. Such a distinction enables one to adjust the approaches to AI application and let the stakeholders know where the application of AI would be most helpful.

These findings can thus be described as having wide practical implications, especially for organizations that deal with grant management. The positives in the improved efficiency and compliance are an indication that embracing AI technology is very useful in grant operations by cutting on time and cost as well as increasing the effectiveness of the processes. For instance, the use of AI in the application processing and the management of the budget reveal that there are gains that can reduce the burden on the staff so they can engage more on the core tasks. Furthermore, AI can further notify of compliance, which can help in avoiding mistakes in granting regulations. Organizations that are looking forward to adopting and implementing the use of artificial intelligence should consider the above benefits in relation to the costs and difficulties of deployment in terms of the fact that, compared to the long-term benefits, the costs are relatively high, and therefore configuration costs can be high at first, but there is always a massive return on investment in the long run by way of increased efficiency and accuracy.

Future studies should isolate qualitative long-term effects of AI, specifically measure how the advantages of AI augmented overtime and if initial cost savings endure. Research should look at the extent to which such tools can be adapted for the various types of grants and to organizations based on size, which focuses on adaptability. Also, the investigation of training and support for the users can be of essence in dealing with implementation resistance and enhancing the success of the implementation process.

VI. Conclusion

This research has discussed the changes brought by artificial intelligence (AI) in the field of grant management, with both strong trends and certain problems. The results further reinforce the idea that the use of artificial intelligence is highly effective in increasing grant processes and procedures' productivity, as well as in making the right decisions on grants' submission, reports, and stakeholders. But there are some limitations due to which the integration of AI is not fully successful, which include the resistance of employees to change, a lack of effective change management processes, technical issues that cannot be addressed immediately, and a and a lack of proper planning and training for employees. In addition, data security and regulatory conformity are critical since AI systems introduce new opportunities and dangers

for organizations. Finally, it can be concluded that AI brings about new opportunities in grant management that should be undertaken with due consideration of diverse implementation challenges to achieve consistent positive development in organizations.

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