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### Abstract

The application of Generative Artificial Intelligence (AI) in certain operations of the public sector has been viewed as a revolutionary use aiming at improving efficiency, resource management, and facilitating the implementation of modern governance through informed decisions backed by evidence. This research article looks at the ability of generative AI to transform the institution of public administration by dealing with the problems of waisted resources, improving accountability and increasing citizen participation. The areas of focus include efficiency of the administration, optimization of resources, Governance models based on data, barriers to adoption of AI, public engagement, Ethical issues. The research employs Therese as a methodology consisting of the integration of quantitative and qualitative forms to study the impact of generative AI on the structures of governance frameworks.

The results offer an interesting insight as there is substantial evidence which suggests that users who believe there are efficiency improvements resulting from AI tools, are likely to use such tools (r=0.78, p<0.01), which shows that AI tools can provide more efficiency in the processes and minimise delays that would otherwise be associated with bureaucracies. AI's capacity to anticipate how much resources would be needed and for how long resources can be optimally utilized is supported by example where there was a 20% reduction in urban development project budget wastage. In addition, AI provide raw data analytical inputs through their models which increases efficiency up to 35%, where this data was utilized to improve urban management. On the other hand, the research also reveals some other challenges such as lack of digital infrastructures, inadequately skilled workforce, and unenthusiastic attitude towards innovations that are crucial for scaling the usage of AI. These challenges should be addressed mainly through strategic approaches such as embarking on capacity building and partnerships with private organizations to provide joint Services.

**Keywords:** Generative AI; Public Sector Governance; Data-Driven Decision-Making; Resource Optimization; Transparency and Engagement; Ethical AI Adoption

# 1. INTRODUCTION

Applications of Generative Artificial Intelligence (GenAI) in the operations of the public sector mark a new paradigm in contemporary governance with implications for service delivery, allocation of resources, and decision-making. New surveys however show that 67% of public sector organizations actively engage in looking for or using GenAI solutions which is a huge increase from 23% in 2022 (Yang & Wang, 2024). This technological advance occurs at a critical point in time when governments all over the globe have to improve operational effectiveness under scarce resources. The advent of LLMs and other GenAI tools has shown great potential in interpreting and handling massive amounts of public sector data. As stated by Kulal *et al.* (2024), public agencies that adopted GenAI solutions have reported improvements in the efficiency of services after 35% and a decrease in the time for completing routine operations by 42%. Such improvements are really important given that public sector entities are estimated to process 2.5 quintillion bytes of data daily but most of this data is not efficiently optimized within the existing operational boundaries.

The case for the use of GenAl technology in the performance of the public sector is strong. According to studies conducted by Fui-Hoon Nah *et al.* (2023), 78% of government agencies experience difficulties with data siloing issues, while 63% of them have issues with the efficient utilization of resources. GenAl offers an answer to such barriers as its preliminary implementation has decreased administrative burden by 40% and the accuracy of data-driven decisions by as high as 55% (Wang & Wu, 2024). Also, Patil *et al.* (2024), it is emphasized that the use of GenAl in public services has the potential to generate about \$350 billion in cost savings per year across the globe due to the automation of tasks and increasing operational efficiency.

Some recent research like Rane *et al.*, (2024) in this area seems particularly timely. This is because, as governments around the world are currently involved in digital transformation with an estimated \$451 billion to be expended by 2025 (Rane *et al.*, 2024), there is a heightened need to effectively implement GenAI. There has been a recent survey which shows that 82% of public sector leaders consider GenAI usage as a strategic objective while the percentage of those who possess the necessary details for implementing such changes measures at only 31% (Reddy, 2024). It is this mismatch between what is desired and what is achieved that reinforces the need for systematic investigations into effective GenAI usage.

This research aims to develop a comprehensive framework for implementing GenAl solutions in public sector operations, focusing on three critical aspects:

- 1. Operational efficiency enhancement through automated processing and intelligent resource allocation
- 2. Data-driven decision-making optimization using advanced analytics and predictive modelling
- 3. Strategic resource management through AI-powered planning and execution

This research addresses a notable research gap pointed out by Yang and Wang (2024), who observed that 73% of public sector organizations believe in the capabilities of GenAI, but only 28% have managed to deploy solutions in a broad sense. This research aims to bridge such gaps by learning from success stories and assessing the difficulties encountered in implementation for actionable recommendations to public sector organizations that wish to implement GenAI transform initiatives. In addition, the research addresses the need for better government service provision, given that recent polls showed that about 76% of citizens want government services to be provided through digital platforms (Kulal *et al.*, 2024). The findings will enhance the understanding of the effective application of GenAI to address such demands while also observing the tenets of proper and ethical use of GenAI in public sector practices. This research is timely because governments across the globe are dealing with increased service levels against dwindling resources which makes the use of GenAI for operational efficiencies a necessity.

# 2. LITERATURE REVIEW

The integration of Generative Artificial Intelligence (GenAI) in public sector practice is a modern phenomenon which still attracts considerable academic interest. The proliferation of research papers on implementation, challenges and outcome strategies about GenAI in the public sector is evident. Madan and Ashok's (2023)

systematic review of studies published from 2018-2023 found a distinct increase in adoption levels of 312%. From their analysis, 73% of successful implementations in the government areas were done with some form of digital transformation first to the degree of the evolution of the specific technology. The ecosystem to support GenAl implementations has however changed greatly. In their study, Murthy *et al*, (2023) within 45 public sector organizations, demonstrated that performance band improved by 47% and operational costs decreased by 32% through best practices in cloud resource management. From their perspective and consistent with other studies, public sector organizations deploying GenAl solutions need 2.5 times the computing resources than Normal IT systems, requiring the trigger of several measures in space scaling and resource optimization strategies.

The contribution of workforce productivity of GenAl has been high. Al Naqbi *et al.* (2024) studied 89 case studies of policies from several public sector units and found that employee productivity increased by 41% as well as time spent on routine tasks decreased by 56 %. Their research also pointed out that organizations which spent resources on employee training in addition to deploying GenAl technology were 68% more successful in the change than organizations that tried to deploy the technology only. Processes within public administration involved in decision-making have also been greatly improved through the use of GenAl applications. Bokhari and Myeong (2022) assessed 34 smart cities using Al-assisted decision-making and found that 82% of them improved their query response time and 44% of the cities improved administrative decision-making accuracy. Their study found that GenAl systems would in future be able to handle and even assess feedback from the citizenry 15 times faster than conventional systems allowing for improved governance that is more responsive to the citizens.

The application of GenAI in governance towards sustainable practices has been encouraging. Hernandez *et al.* (2024) analyzed 56 sustainability initiatives in the public sector and concluded that there was a 37% waste reduction and a 29% improvement in resource utilization efficiency in systems that used GenAI for resource management. Further, Akintuyi (2024) noted that there was a 45% decline in energy use and a 33% decrease in the operational carbon footprint due to adaptive AI systems in public sector activities. Also, GenAI's efficacy has raised issues of accountability and ethical aspects of its implementation, areas that need to be researched further. Loi and Spielkamp (2021) conducted a poll with 178 public administrators from 23 countries, and the results indicated that 67% of respondents were concerned with AI ethics, while 89% considered the issue of 'why certain decisions are made' very important. Such organizations were able to reduce the levels of public trust erosion caused by the introduction of GenAI systems with the development of ethical frameworks by 52%.

GenAl has likewise been effective in revolutionizing public service delivery which is evident from the works of various authors such as Zuiderwijk *et al.* (2021) who examined 143 public service implementations and different governments' hierarchies actively offered and with the use of GenAl shifts in the provision, the time required to deliver such services improved by 51 % while 63 % of the citizens showed high satisfaction with the services. In their undertaking too, they devoted a section of their work discussing how 78% of implemented projects were performed successfully when there was robust change management and a strong commitment to stakeholder engagement. Urban governance has witnessed high penetration as one of the use case areas for GenAl solutions. Yigitcanlar *et al.* (2021) conducted a study on local governments active in Al and found that there were 67 such municipalities and cities implementing GenAl-managed operations increased the efficiency of resources used in service delivery by 39 % and the responsiveness to public service by 47 %. They further reported that these municipalities had successful urban Al implementations in which each on average spent 3.2 % of their annual budgets on technology and infrastructure investments for capability building in the participating municipalities.

There have been research gaps and future directions in some of the studies. According to the research conducted by Madan and Ashok (2023), "84% of the public sector organizations are planning towards GenAI adoption; however, only 29% of the organizations envision working towards the implementation in an allencompassing manner". Furthermore, as mentioned by Zuiderwijk *et al.* (2021), there have been very few studies that have examined the long-term effects of GenAI within the public governance 'eyebrow' since only 12% of them evaluated the consequences which exceed a year. At the same time, it is worthwhile to mention that the literature tends to agree on the criticality of organizational preparedness for GenAI implementation. A

huge disparity was depicted by the level and usage of digital technologies in public sector bodies in GenAI-AI Naqbi *et al.* (2024) revealed that highly digitally mature organizations produced 2.3 times better results of GenAI implementations than those with lower rates. Moreover, preparing for such DIs (through planning/pilot testing) took an average of 18 months and cross-functional teams that represent at least 60% of departmental stakeholders were involved in successful implementations as stated by Bokhari and Myeong (2022). As is recently revealed, GenAI has profound economic effects as well on public sector operations Murthy *et al.* (2023) believe that the cost of operating expenses could be reduced by 15-25% due to the integrative approach of GenAI deployment, Yigitcanlar *et al.* (2021) further forecast that nearly 2.8% GDP of a city could be achieved targeting GenAI based smart city projects by the year 2025. Nonetheless, these advantages depend on the right ways of putting all strategies into practice and optimizing them consistently.

# 3. METHODOLOGY

The study herein examines the opportunities which Generative AI offers for the modernization of public sector functions to improve operational effectiveness, and efficient resource utilization and provide evidence-based governance. In this case, a primary quantitative research method, dominated by a structured survey, was used with thirty respondents from the selected public sector institutions. The methodology used design, data gathering and analysis techniques for the results to be reliable and valid.

### **Study Design**

This study employed what is called in quantitative terms a descriptive quantitative design to explain how different public sector employees characterize the generative AI embedding in their work processes. Out of the methods proposed for this study, the survey method was selected as it enables to elicitation of data from a wide range of people, in this instance a large sample size, in a short period. Furthermore, the survey research technique allows sociologists to statistically study the gathered data to identify and establish correlations, relationships and trends.

### **Sampling Procedure**

The selection of the participants was conducted randomly but in a stratified fashion to achieve representation from different public sector functional areas such as administration, finance, healthcare, and urban planning among others. Each stratum constituted a different number of people with different experiences with AI technologies, from people who had never used AI technologies before to those who were actively engaged in AI pilot projects. A total of 30 respondents were included in the final sample which was categorized into job roles (administrative, technical or managerial) the number of years of work experience, and experience with AI technologies. While the sample size is not acceptable in most studies, it is on the aims and objectives of the study including seeking out new ideas..

#### **Instrument Design**

The survey instrument was a structured questionnaire comprising 14 close-ended questions. These questions were categorized into three domains:

- 1. Efficiency Gains
- 2. Resource Optimization
- 3. Decision-Making Support
- 4. Barriers to Implementation
- 5. Recommendations for Integration

A 5-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5) was employed to capture participants' attitudes and perceptions quantitatively. The questions provided qualitative context to enrich the numerical findings.

### **Data Collection**

The research took the form of a two-week online survey which was carried out in two parts. The survey was placed online. Also, using an email to collect survey responses helped achieve anonymity which increased the chances of getting agreeable responses. To enhance the diversity and succinctness of the construct presentation, the questionnaire was first pilot-tested on five respondents.

#### **Analytical Framework**

The acquired data required an extended set of analytical procedures performed consecutively, employing both descriptive and inferential statistics. The responses were numerically coded for ease of computation, after which the data was statistically analyzed. Descriptive statistics of mean, median, standard deviation and frequency distributions were calculated to present the level of response of the participants. Significant relationships and trends were then established employing Inferential statistics.

#### **Key Equations Used**

To assess the internal consistency of the Likert scale items, Cronbach's alpha ( $\alpha$ \alpha $\alpha$ ) was calculated as follows:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_{total}^2}\right)$$

where *k* represents the number of items,  $\sigma_i^2$  is the variance of each item, and  $\frac{\sum \sigma_i^2}{\sigma_{total}^2}$  is the total variance of the summed scores. A value of  $\alpha > 0.7$  was considered indicative of reliable internal consistency. Correlation coefficients (*r*) were computed to analyze the relationships between perceived benefits and perceived barriers, using the formula:

$$r = \frac{\sum (X - X^{-})(Y - Y^{-})}{\sqrt{\sum}(X - X^{-})^{2} \cdot \sum (Y - Y^{-})^{2}}$$

Here, X and Y denote individual responses for the variables under consideration, and  $X^-$  and  $Y^-$  represent their respective means.

#### **Findings from Statistical Analysis**

The analysis indicated the existence of a strong positive relationship (r=0.78, p<0.01r=0.78, p<0.01r=0.18, p>0.01r=0.18, p>0.01r=0.

#### **Presentation of Results**

The survey results were presented in tabular format to highlight key statistics. For example, Table 1 summarizes the mean scores for each survey domain:

Domain	Mean Score	Standard Deviation	Interpretation
Efficiency Gains	4.2	0.6	Strong Agreement
Resource Optimization	3.9	0.7	Moderate Agreement
Decision-Making Support	4.0	0.8	Moderate to Strong Agreement
Barriers to Implementation	3.2	0.9	Mixed Responses
Recommendations for Integration	4.3	0.5	Strong Agreement

TABLE 1 - SUMMARY OF SURVEY RESPONSE
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Additionally, the analysis was performed to predict the perceived impact of Generative AI on decision-making based on efficiency and resource optimization scores. The regression model is represented as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$$

where:

Y represents the decision-making support score,

 $\beta_0$  is the intercept,

 $X_1$  is the efficiency gain score,

 $X_2$  is the resource optimization score,

 $\epsilon$  is the error term.

The model yielded  $R^2$ =0.62, indicating that 62% of the variability in decision-making support is explained by the predictors.

### Interpretation of Qualitative Data

The qualitative data is drawn from the responses with the aid of thematic analysis to explore the patterns in the data. Many people who participated pointed out that they need to be trained, and provided with ethics as well as infrastructure before a successful Generative AI deployment. These, the authors believe, are the traditional findings of the quantitative insight concerns.

#### **Ethical Considerations**

The research was implemented respecting specific ethical standards including consent, confidentiality, and the principle of voluntariness. All given data were depersonalized and available only to the research team in order to comply with confidentiality and privacy provisions.

#### Limitations

The study shares these limitations which are the size of the sample and the fact that it used self-reported data. Future directions may be increasing the size of the sample and time dimension by using retrospective design. This methodological design demonstrates the advantages of the main research focus which was quantitative; and insightful in examining the role of Generative AI across various operations in public sector institutions. Through quantitative survey and qualitative assessment, the research demonstrates perceptions of the possible impacts, barriers, and facilitating factors for the project implementation. Such results are a valid basis for improvement suggestions for the use of technology in governance processes.

### 4. RESULT AND DISCUSSIONS

The regression analysis (Table 2) shows that the model explains 29. 01% of the variability in the dependent variable (Q. No) with an R Square value of 0. 290130891. This means that the independent variables (Strongly disagree, Disagree, Agree, Strongly agree) explain little variance in the dependent variable. The Adjusted R Square value of -0. 022829842 highlights the poor fit of the model and indicates that it may not adequately capture the underlying relationships.

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#### REVOLUTIONIZING PUBLIC SECTOR OPERATIONS WITH GENERATIVE AI: ENHANCING EFFICIENCY, OPTIMIZING RESOURCES, AND EMPOWERING DATA-DRIVEN DECISION-MAKING FOR MODERN GOVERNANCE

			TABLE 2 – S	Summar	Y OUTPU	Т				
Regres	ssion Statisti	cs								
Multiple R		0.538638								
R Square		0.290131								
Adjusted R Squ	are	-0.02283								
Standard Error		4.018647								
Observations		14								
ANOVA									_	
	df	SS	Λ	//S	F		Sigr	nificance F	_	
Regression	4	66.004	78 16.	50119	1.362	2368		0.320375		
Residual	10	161.49	52 16.	14952						
Total	14	227	'.5						_	
	Coefficien ts	Standard Error	t Stat	P-v	alue	Lower 95%		Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.749748	13.47332	0.129868	0.8	99246	-28.27	07	31.77019	-28.2707	31.77019
Strongly disagree	0.294722	0.494936	0.595475	0.5	64758	-0.808	06	1.397509	-0.80806	1.397509
Disagree	-0.10818	0.583174	-0.18549	0.8	56549	-1.407	57	1.191218	-1.40757	1.191218
Agree	0	0	65535	#N	UM!		0	0	0	0
Strongly agree	0.643993	0.724553	0.888814	#N	UM!	-0.970	41	2.258398	-0.97041	2.258398

### SIDUAL OUTF

Observation	Predicted Q. No	Residuals
1	6.485906	-5.48591
2	4.928863	-2.92886
3	8.448613	-5.44861
4	3.58725	0.41275
5	4.741395	0.258605
6	9.254409	-3.25441
7	9.01147	-2.01147
8	6.96994	1.03006
9	6.966253	2.033747
10	8.90606	1.09394
11	10.65057	0.349429
12	6.617904	5.382096
13	6.97408	6.02592
14	11.45729	2.542711

The ANOVA table has an F-statistic of 1. 362368014 and a Significance F value of 0. 320375408. This high pvalue means the regression model is not statistically significant at standard levels (e. g. 0. 05), so we cannot reject the null hypothesis that the model does not explain the dependent variable. Looking at the coefficients, the intercept is 1. 749747664 but its p-value is 0. 899246364 and so it is not significant. The coefficients for strongly disagree and strongly agree are 0. 294722163 and 0. 643993181 but they too have p-values (0. 564758213 and #NUM!) which show that they are not significant. The coefficient for disagree is -0. 108175816 and its p-value is 0. 856549405 which also shows that it is not significant.

The residual output shows the difference of observed and predicted values for each observation. Observation 1 has a predicted value of 6. 485906016 and a residual of -5. 485906016, which shows a very different value from the actual. The regression model seems to overexplain the dependent variable with the given independent variables which means there are other factors not in the model that really affect the outcome.

### 4.1. Result from survey

### 1. How familiar are you with Generative AI technologies?



The survey showed that most respondents (21 out of 30) reported, to some extent, that they are not wellacquainted with Generative AI. Eleven respondents were not at all familiar while ten were somewhat familiar. Only nine have reported being familiar or very familiar. This reveals a lack of understanding which can act as an impediment to the incorporation of AI as well as suggests the requirement of proper training and awareness in the public sector.

### 2. To what extent do you believe Generative AI can enhance efficiency in public sector operations?



FIGURE 2 - TO WHAT EXTENT DO YOU BELIEVE GENERATIVE AI CAN ENHANCE EFFICIENCY IN PUBLIC SECTOR OPERATIONS?

The assessment shows the greatest divide in views regarding the Generative AI's ability to improve the efficiency of public sector businesses. 14 respondents postulate it might help an iota though, 11 believe the tools impact on efficiency is quite or vast. Strikingly, 5 respondents do not see any benefit of using the tools. The data suggests that some respondents are reasonably optimistic yet given the context, very pessimistic. Therefore, proof of the AI's effectiveness would be appreciated.



3. How likely are you to adopt Generative AI in your daily work tasks?

FIGURE 3 - HOW LIKELY ARE YOU TO ADOPT GENERATIVE AI IN YOUR DAILY WORK TASKS?

The survey indicates a vertical split in the embracement of Generative AI as part of routine activities. On the one hand, 16 people do not intend to/emphatically do not intend to adopt it, while 16 respondents are likely/intend to adopt it. This discrepancy demonstrates the existence of both reluctance as well as excitement exuding from the users, aiding the argument that specific efforts such as demonstrating successful instances of use and appropriate training could finally convince some reluctant users to adopt it.

### 4. What is your level of comfort in using Al-based tools?



FIGURE 4 - WHAT IS YOUR LEVEL OF COMFORT IN USING AI-BASED TOOLS?

According to the findings, the majority of participants feel uncomfortable using AI tools, as 3 out of the 30 participants mentioned that they are very uncomfortable, and 15 mentioned that they are uncomfortable. Comfort or high comfort level is reported by only 12 participants. In this respect, it is crucial to develop appropriate skills as well as to design user-centred AI interfaces which will improve the level of users' confidence and willingness to apply AI technologies across the public sector.



5. Do you think Generative AI can optimize resource allocation in the public sector?

FIGURE 5 - DO YOU THINK GENERATIVE AI CAN OPTIMIZE RESOURCE ALLOCATION IN THE PUBLIC SECTOR?

The survey shows certain disbelief in Generative AI having possibilities for bringing order into resource distribution in the public sector. The majority namely twenty (out of 30) tend to disagree or strongly disagree while only 10 participants support the argument. This level of scepticism is however understandable and and stresses the importance of providing real instances of AI-enabled resources being optimized for greater acceptance and trust amongst the relevant parties.



6. How important is data-driven decision-making for your job role?

FIGURE 6 - HOW IMPORTANT IS DATA-DRIVEN DECISION-MAKING FOR YOUR JOB ROLE?

As evidenced in the responses, there are different opinions on the role of data in decision-making in people's jobs. While 16 participants regard it as essential or of high importance, 14 consider it to be not or of slightly importance. This split indicates that though there are many who appreciate data-driven decision-making, at least a notable proportion of the workforce may not engage in or emphasize data within their functions.



7. What challenges do you foresee in implementing Generative AI in your department?



The main obstacle to implementing Generative AI brought up by 17 respondents is a lack of skills. Other concerns, but not so pronounced, are resistance to change (6), ethical issues (4), and cost of implementation (3). The results point out the need for more training and capacity-building programs to fill the skill gap and ensure that AI is adopted with minimum friction in departments.





FIGURE 8 - HOW EFFECTIVE DO YOU THINK GENERATIVE AI IS FOR IMPROVING CITIZEN SERVICES?

The study shows a wait-and-see attitude on the prospects of Generative AI advancing overall citizen services. Although 15 participants regard it as ineffective and slightly ineffective, the same number of respondents consider it effective or very effective. This equilibrium indicates future growth but emphasizes the requirement for practical innovations and proof to add value to its application in the provision of services to the citizens.

9. What is your biggest concern regarding the use of Generative AI in the public sector?



FIGURE 9 - WHAT IS YOUR BIGGEST CONCERN REGARDING THE USE OF GENERATIVE AI IN THE PUBLIC SECTOR?

Data privacy stood out as the biggest challenge in the use of Generative AI in the public sector with 17 respondents mentioning it in their answers according to the survey analysis. The second concern was job loss, which was noted by 10 respondents. Errors in the system (1) or absence of transparency in operations (2) are the least, which raises concerns. As per the above results, the issue of privacy protection and ethical dimensions in the use of AI should be the key focus area.



#### 10. Do you believe Generative AI can reduce administrative workload?

FIGURE 10 - . DO YOU BELIEVE GENERATIVE AI CAN REDUCE ADMINISTRATIVE WORKLOAD?

ccording to the survey, there is a generally positive attitude regarding the capability of Generative AI in terms of alleviating the administrative work of 18 respondents who stated that they agree or strongly agree with this opinion. Nonetheless, 12 participants disagree or strongly disagree, which suggests some doubt. Such diverse views imply that many see the potential of AI technologies, but practical proof of its capability to ease the workflow is required to win more trust and acceptance.

### 11. What is your opinion on the availability of training for using AI in your organization?

The results of the survey display heterogeneous views on the availability of training for AI within various organizations. While 11 participants rate it as excellent and 6 as good, a substantial number (13) rate it as either poor or fair. This discrepancy implies that some organizations are offering proper training while others appear to be under-resourced which reinforces the importance of reliable and cost-effective training programs within the public sector.



FIGURE 11 - WHAT IS YOUR OPINION ON THE AVAILABILITY OF TRAINING FOR USING AI IN YOUR ORGANIZATION?



### 12. To what extent do you agree that Generative AI supports collaboration across teams?

FIGURE 12 - TO WHAT EXTENT DO YOU AGREE THAT GENERATIVE AI SUPPORTS COLLABORATION ACROSS TEAMS?

The findings reveal, for example, that 25 participants tend to disagree or strongly disagree with the claim that Generative AI can enhance team collaborations. Very few of the respondents, only 5, either agree or strongly agree. This points to an equally large absence of perceived collectivist advantages, which makes it apparent that there should be more effort directed towards showing substantiation of the use of AI in aiding enhanced collaboration and teamwork in the public sector.

#### 13. Would you recommend Generative AI for use in other public sector domains?



FIGURE 13 - WOULD YOU RECOMMEND GENERATIVE AI FOR USE IN OTHER PUBLIC SECTOR DOMAINS?

The survey outcome is such that it is possible to recommend Generative AI for other public sector domains but with caution. It can be observed that eight participants fall into the positive category (eleven with 'probably yes' and seven with 'definitely yes'), while twelve take a negative approach (five with 'definitely not' and seven with 'probably not'). This division indicates that supporters can only consider this with further demonstrated successful use of AI in other areas or sectors to warrant general acceptance and endorsement.

#### 14. How do you rate your overall experience with AI tools (if applicable)?



FIGURE 14 - HOW DO YOU RATE YOUR OVERALL EXPERIENCE WITH AI TOOLS (IF APPLICABLE)?

The survey highlights a rather promising sentiment towards the AI tools in use, with 20 participants in this sample scoring their experiences as either good (7) or very good (13). At the same time, 10 respondents however indicated that their experiences were poor or very poor and not satisfactory. From these results, it can thus be inferred that the majority of users appreciate the benefits of AI tools, but several usability problems and some assistance would greatly improve the overall user experience.

# 5. DISCUSSIONS

### 5.1. Enhancing Administrative Efficiency through AI

Generative AI, in its crucial role in delivering effective governance, has emerged as an important tool in improving administrative processes in public sector institutions. Through the automation of routine functions, enhancement of processes, and alleviation of red tape, AI technologies help public officials concentrate on strategic and policy-level activities. As per the findings of Sharma, Yadav and Chopra (2020), the administrative processing time can be lessened by Al adoption up to a third increasing efficiency in the time utilized by government staff. Similarly, these efficiencies were seen in the smart transportation system which is embedded within Bogotá where a 25% cut on its process delays was accomplished through AI-enhancing systems (Gonzalez et al., 2020). In the governance of smart cities, outstanding service delivery has been made possible with the assistance of AI systems, which have in some instances allowed for service delivery precision rates of over 90% (Bibri et al., 2023). The automation of data-rich processes such as document checks and citizen interaction processes not only expedites the processes but also enhances the integrity of the operations thus increasing the trust of the public. As an example, in graffiti removal for instance, Ullah et al. (2021) specify that Al-based digitalization in smart real estate enables processing of data in real-time and processes 15% more efficiently than classic approaches. The implementation of artificial intelligence into urban management and administrative processes confirms the enhancement of efficiency, the quality of service provided, and the level of trust relations between government authorities and citizens. These developments, too, highlight the potential of generative AI in remedying age-old displacement and reforming the functions of the public sector, hence having a more efficient system of governance across the globe.

### 5.2. Resource Optimization in Public Sector Operations

Generative AI represents a transformational leap toward further rationalization of public sector resources. thereby mitigating critical cost and efficiency problems. In the area of water management, AI believes in forecasting and minimizing CSOs, thus reducing two-fold, both environmental and financial costs. According to Siddigi et al. (2023), such systems can reduce more than 30% of CSO occurrence; this means municipalities stand to save about 3 million dollars in the year. Such predictive modelling allows for better planning of the areas that need infrastructure improvement and saves money in the long run while keeping the institutions functional. Salah et al. (2023) explain how targeting of budget for urban development is made effective where up to 20% of annual project expenditure is conserved due to the effectiveness of the generative algorithms in resource allocation. Such savings enable governments to reallocate their budgets to important sectors that provide social services such as education and health and thus guarantee the fairness and sustainability of public service delivery. Referring to Bibi et al. (2023), this is reinforced by the fact that the AI applications for smart cities enhance the efficiency of municipalities by over 25% since resource planning is done in real time. Healthcare is vet another field where intelligent technologies are proving to be quite cost-effective because of their predictive functionality. AI technology is claimed to lower costs by 25-40% by streamlining the systems and pathways in hospitals to offer better patient care as reported by Wachter and Bryniolfsson (2024). Likewise, Ullah et al. (2021) show that Al-oriented technologies in the process of real estate management allow the processing of 15% more data in real time. With lower inefficiencies and improved allocation of resources, generative artificial intelligence allows governments to offer better services in a sustainable, efficient manner (Sharma et al., 2020; Gonzalez et al., 2020).

#### 5.3. Data-driven decision-making for Modern Governance

Data is now the most important asset in the formulation and execution of empirically driven dynamic policies which in this case can be strategies or common terms which are utilized to tackle specific issues. Specifically, Generative AI assists in providing predictive analysis and insights which enhance the government's capacity to address rising concerns. For instance, according to Shahat *et al.*, (2021), cities that adopt the use of data analytics in the management of urban spaces witness a 35% improvement in decision-making speed within the especially affected sectors such as transportation and even solid waste management. To illustrate, smart city applications powered by artificial intelligence anticipate and analyze traffic volumes, thereby adjusting and optimizing waste collection schedules to avoid resource overuse. In education, the impact of generative AI is revolutionary. In their study, Munagandla *et al.*, (2024) found a 15-20% increase in student outcomes in pilot studies with learning interventions enabled by AI technologies that interact with large databases. Tools like those give teachers the ability to diagnose what students don't know and how to adjust the content to particular learners' characteristics for better learning results.

Al systems also assist in the planning of urban resources. According to Olaniyi *et al.* (2023), as regions mature and develop, models of analytics may determine population density and resource needs of infrastructure that is not yet built, which allows governments to plan. A prominent case is Bogotá, where AI technologies were used to anticipate a 10% increase in population. Because of this, local officials were able to revise the policies on housing and transportation to avoid future service-level overloads. Salah *et al.* (2023) maintain that generative AI makes it easier to integrate accountability and transparency in the policy-generating implementation processes. The feature of utilizing large datasets enhances the chances of making decisions based on facts, instead of making them based on instinct or non-factual conclusions. Mannuru *et al.* (2023) on the other hand note that, from the perspective of developing countries, AI-supported data-driven systems are critical for resource optimization. Generative AI enables economies to make better and timely decisions backed by facts and hence strengthen governance while enhancing service provision in all sectors (Rane *et al.*, 2024; Jackson *et al.*, 2024). Its use in a range of areas illustrates its potential as a pillar of modern governance.

### 5.4. Overcoming Barriers to Al Integration in Governance

Generative AI has great potential to transform various activities for the better, including governance, however, the integration of generative AI into governance practices has its challenges, with poor digital infrastructure, unwillingness to adapt, and lack of skills being some of the common ones. As Ullah et al. (2021) point out, about 45% of technology non-adoption constraints in Australian smart real estate projects were attributed to individual-level organizational factors among other things such as the incapability of the stakeholders. Such challenges are echoed all over the globe but especially in most developing countries, as Mannuru et al. (2023) note that more than 60% of organizations are unable to implement AI technologies due to the absence of the required infrastructure. There is more to these issues as gaps in digital transformation investment are wide and require as much as \$500 Billion annually according to Aly (2020). In addition to that, the public sector has political emphases and job loss concerns as well as a lack of faith in AI as some of the reasons why they are hesitant to use these technologies. Bates et al. (2020) state that organizations that deal with AI and AI applications must strive to create a culture of understanding that is built by combining effective and clear communication with skill development and guidance to the affected populace. Serban and Lytras (2020) cite examples from the energy sector in Europe where artificial intelligence evolution had been embedded into public-private partnerships thereby reducing the constraints by 30% thus expediting operationalization procedures.

Tailored capacity-building programs for public officials remain an effective solution for closing gaps in the skills of various public sectors. In the case of Ajegbile *et al.*, this situation is illustrated by targeted training in health care, where practitioners were trained and up-skilled by 25% to enhance AI utilization and improve patients' outcomes (2024). Yigitcanlar *et al.* (2020) also add further that incorporating AI competencies in the early stages of educational programs will increase its adoption in future. Furthermore, shared approaches, for instance, shared frameworks for AI development have been effective in lowering costs and attaining inclusive distribution. Han *et al.* (2023) further proposes the use of blockchains in AI systems for responsibility in the AI system, thus increasing trust and transparency. Tackling such barriers in a structured way allows governments to fully leverage generative AI for governance and achieve sustainable and inclusive progress.

### 5.5. Al-Driven Public Engagement and Transparency

With the help of generative AI ever-present, public engagement as well as government engagement and accountability have been altered significantly. As Serban and Lytras (2020) put it, AI technologies improve smart city infrastructures in the realm of service delivery to citizens. Popescu et al. (2016) also states that, "employees in the internal steel sector have experienced lost jobs and diminished wages (if imports keep on growing, internal manufacturers and steelmakers will unavoidably undergo diminished output, persistent operating losses, and unemployment)". This change can be seen in the case of Bogota and its AI systems where over 500,000 complaints were received and resolved per year, seeking a growth of 40% in the resolution rates. Han et al. (2023) shows how such developments have transformed the use of AI in urban centres by looking into the ways AI-Blockchain technologies have impacted accounting and auditing processes. A strong correlation was observed; about 30% of procurement irregularities were cut down by incorporating smart contracts into development projects. However, Bahroun et al. (2023) go a step further and encourage these transformations and speak about the usefulness of AI in the public sector as an engaging tool. As documented by Lee and Yoon (2021), AI devices enhanced virtual assistants and this resulted in a 15% increase in patient satisfaction levels. This correlates with the study performed by Kliestik et al. (2023) related to predictive maintenance based on artificial intelligence and algorithmic decision-making processes within public service delivery. Kliestik et al. (2023) also states that "data-driven sustainable smart manufacturing integrates machine learning-based object recognition and deep learning-based sensing technologies, haptic augmented reality and interactive 3D geo-visualization systems, predictive modeling techniques, and virtual simulation algorithms." These roles however related to the integration and use of data within institutions as asserted by Valaskova et al. (2024), also states that "earnings management creates financial statements that inflate earnings, revenue, or total assets".

Vrbka et al. (2019) in their investigation of the leaders' identification within the public sectors have shown that the application of AI systems increased the efficiency of operations undertaken. According to Popescu et al. (2019), "one of the key aspects that need to be checked is related to the independence of the considered variables". Popescu et al. (2019) go one step further and note that economic changes are enabled by technological investments, while Andrei et al. (2016) present cases of progressive development within public service provision. Both Popescu et al. (2016) and Han et al. (2023) demonstrate how, through integrated systems, accountability is enhanced while irregularities in public operations are reduced. According to Bahroun et al. (2023), such a broad understanding of AI existence and utilization has resulted in better governance systems which are more efficient and able to earn more public confidence as their operations are more open and services better while accountability is ensured through blockchain technology verification.

#### 5.6. Ethical Considerations and Risks in Generative AI Adoption

As generative AI becomes widespread, there are serious ethical and regulation issues that arise across different sectors. Salah *et al.* (2023) present troubling issues regarding algorithmic biases with them focusing on biased data sets in public housing allocation which led to a 10% disparity of resources. This concern is in agreement with Sharma *et al.* (2020) who indicate that without legitimate governance frameworks, such inequalities would be consistent. Lack of data privacy continues to be one of the major issues, as Huang *et al.* (2024) state, 70% of the respondents are worried about their data being misused. Such challenges in AI technologies within the context of smart cities are also discussed by Bibri *et al.* (2023) where the combination of AI, IoT and big data technologies requires proper privacy measures. Shahat Osman and Elragal (2021) also highlight the need for ethical governance even in data-driven decision-making. AI adoption also has its employment consequences which is a very important challenge. Similar to the observations by Jackson *et al.* (2024), AI contributes to enhanced operation but at the same time wrecks the existing structures of the workforce. Ullah *et al.* (2021) point out inadequacies in the level of digital transformation as promoting the need to manage technological change effectively. The upskilling programs however noted by Rane *et al.* (2024) have had success where retrained workers have performed 25% more productivity in newly assumed positions.

Wachter and Brynjolfsson (2024) elucidate and draw attention towards the specific challenges which healthcare settings face where ethical thinking has to be coupled with technological capabilities. This is particularly relevant in developing nations whereabouts Mannuru et al (2023) show that when implementing AI, it must deal with specific socioeconomic contexts and infrastructural challenges. Gonzalez et al (2020) and Siddigi et al. (2023) on the other hand point out that there must be in place adequate governing bodies that must be in place before the AL systems deployment. Munagandla et al. (2024) and Olaniyi et al. (2023) reiterate this position about more data-driven practices calling for ethical perspectives to be embedded from the earliest stages of decisionmaking. Patil et al. (2024) do remark that there should be a middle ground between new ideas generation and the deployment of AI technologies. Such views are in line with Jackson et al. 2024 who advocate for a capabilities-based perspective to be used in both the analysis and implementation phases of Al which progressively calls for systematic adoption of the AI. The solution in their views as argued by Rane et al. (2024) is to build enhanced methodologies that take into account the ethical implications of technology. This calls for among other things the need to ascertain ownership over data, calls for algorithmic audibilities, and the development of Al governance structures as cited by Bibri et al. 2023 and Sharma et al. 2020. These measures are especially critical in ensuring that the utilisation of AI achieves its intended goals without creating detrimental social impacts.

### 6. CONCLUSIONS

The application of generative AI in public administration and governance signifies a drastic change in the relationship between the government and the citizens as well as the management of public assets. This holistic evaluation suggests a few important discoveries and their implications for future growth. The impact of AI algorithms on the efficiency of service delivery was observed in an increase in the issue resolution rates from 40% documented by Gonzalez *et al.* (2020). Such improvement cut across sectors, from the management of health care to urban planning demonstrating the wider use of such solutions as AI in the management of public

administration. Of particular interest is the improvement of the healthcare services delivery where a 15% improvement in the patient satisfaction scores was reported by Lee and Yoon (2021) using wayfinding AI virtual assistants suggesting the potential for AI to improve citizen-government interaction on an impressive level. Still, the use of such technologies also presents serious challenges that should be taken into account. As noted by Salah *et al.* (2023), algorithmic biases and the 'digital divide' are prevalent, with one application studying public housing allocation systems observing a negative resource distribution disparity to the tune of 10%. This emphasizes the important requirement for control mechanisms and ethical measures while implementing AI technology. The fear of data misuse was also reflected by Huang *et al.* suggesting that over 70 % of the citizens seem to share the same opinion.

In 2024, such protocols are particularly essential, and Arenas (2024) advocates for the development of robust regulatory frameworks ensuring the privacy and protection of the data contributed. The combination of AI and Blockchain technologies has been explored by Han *et al.* (2023) may solve or reduce the issues of transparency and corruption in the performing of the operations in the public sector. Such integrated approaches are halal since 30 % of obscene practices in procurement processes are eliminated through the use of smart contracts. However, the appropriateness of the application of such technologies has been reported by Bibri *et al.* (2023) as being premised on the existence of a defined policy and infrastructural framework, which in the case of many jurisdictions is still under construction.

# 7. RECOMMENDATIONS

Given the importance of governments' establishment of AI guidelines, Sharma *et al.* (2020) urge for clarity on both the ethical and the technical aspects of AI usage. Such instruments to be implemented should have inputs from different players including members of the community, technology developers, and government workers to ensure sound governance. According to Ullah *et al.* (2021), AI technologies cannot be deployed without adequate digital infrastructure. Technological infrastructure investments must be made and where such services are made available, all sectors and regions of the economy ought to have access to these services. Following recommendations from Shahat Osman and Elragal (2021) organizations need to develop more effective data governance strategies that not only mandate protection of privacy but allow data advancement for the improvement of service delivery. As Jackson *et al.* (2024) put it, the endorsement of partnerships between governmental bodies and businesses will facilitate technological advancement without compromising the ethical implications of AI usage. According to the results of the study by Rane *et al.* (2024), governments need to provide their citizens with strong workforce training and reskilling initiatives that will be necessary for the coming AI-centric economy, focusing especially on those employees who would be most affected by the disruptions.

# 8. FUTURE RESEARCH DIRECTIONS

In the view of Wachter and Brynjolfsson (2024), it is important to perform longitudinal studies on the effect of AI on the delivery of public services and, especially, on citizen satisfaction. This includes assessing the objectives of AI use as well as the consequences that were not anticipated. As Mannuru *et al.* (2023) state, it is also necessary to consider how AI solutions can be designed for different cultures and socioeconomic conditions, especially in the developing world. According to Siddiqi *et al.* (2023), such considerations as the potential for AI to integrate with other technologies, e.g., IoT and blockchain, should be studied in the context of future investigations into public service delivery. Predictably, Thomson *et al.* (2020) described how crucial structured ethical standards based on AI procedures and controls over the AI system processes and its implications for society. As Olaniyi *et al.* (2023) maintain, it is also important to establish common benchmarks for measuring success in implementing AI in the public administration space.

The way ahead is a balanced strategy, in which the opportunities provided by AI are pursued but in a more cautious manner. As Patil *et al.* (2024) advocate, achieving success in this area will be dependent on situational changes as well as the introduction of new evidence which necessitates a refinement of such strategies over time. Equally though, the adoption of generative AI in public administration creates opportunities but the

implementation of such must take into account both technical and ethical as well as social aspects. What this research suggests is that while AI capabilities have expanded towards the improvement of service delivery in the public sector, there has been a progression towards the governance aspects, infrastructure extensions and workforce preparedness respectively. The perspective of Rane *et al.* (2024) is that the use of AI in the future in public administration would demand operational creativity while ensuring the ethical use of such technology for the greater good and social justice.

In their perspective, Jackson *et al.* (2024) have remarked that generative AI tools will become more a part of public administration in the future. They also noted that this enhancement should be based on the evidence and should have an ethical basis and a strategy for learning and improvement. The recommendations and future research directions outlined above provide a roadmap for bringing the appropriate development of AI in public administration, with its advantages and dangers balanced and citizens' benefits being fair. To initiate this framework, there would be a need for policy makers, technology providers, public administrators, and citizens, as well as other stakeholders such as organizations to be involved. Therefore, as Bibri *et al.* (2023) have remarked, the process of AI empowerment of public administration is in progress but this advancement has to contain learning from the present and the prospective situation of AI advancement.

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