Digitization of local self-government based on the use of artificial intelligence in the context of sustainable development

Olha Rudenko[1*], Olena Zaika[2], Vladyslav Varynskyi[3], Inna Kulchii[4], Alina Myroshnychenko[5]
[1]Department of Management and Administration, National University "Chernihiv Polytechnic", 95 Shevchenko Street, 14035, Chernihiv, Ukraine; olham.rudenko@gmail.com (O.R.).
[2]Department of Philosophy, Public Administration and Social Work, Zaporizhzhia National University, 66 Universitetskaya street, 69600, Zaporizhzhia, Ukraine; Dmytro Motornyi Tavria State Agrotechnological University, 66 Universitetskaya street, 69600, Zaporizhzhia, Ukraine; helen.zaika@znu.edu.ua (O.Z.).
[3]Department of Philosophy and Ukrainian Studies, National University "Odesa Maritime Academy", 8 Didrikhson street, 65052, Odesa, Ukraine; vladvarinskiy@gmail.com (V.V.).
[4,5]Department of Public Management, Administration and Law, National University «Yuri Kondratyuk Poltava Polytechnic», 24 Pershotravneva street, 36011, Poltava, Ukraine; nafu.sail@gmail.com (I.K.) feup.Myroshnychenko@nupp.edu.ua (A.M).

Abstract: The subject of the research is the processes of transformation of modern local self-government public administration based on the development and application of AI-based technologies. The article claims that the rapid development and advancement of digital technologies, especially artificial intelligence (AI) technologies, made significant impact on public governance at the local level, both in its 'architecture' and processes. It is shown that AI encompasses a range of capabilities that are accelerating progress toward the sustainable development and SDGs, while at the same time it may also inhibit some targets within sustainable development. It is emphasized that increasing government's AI maturity in local self-government requires pairing human and technical capabilities with strategy and governance.

Keywords: Artificial intelligence, Digitization, Local self-government, Public administration, Sustainable development.

1. Introduction

In modern conditions, within the framework of the process of the "Information Society" system' formation, advanced functions of public administration are implemented as a key factor in increasing the level of efficiency of all structures of modern society. The main components of electronic-digital support of economic and social processes are being created in order to accelerate the flow of information data, which is the basis for resource provision of all management systems operating within the framework of the activities of state and municipal bodies regulating socio-economic relations, entities of the public sector of the economy, as well as enterprises and organizations of the entrepreneurial sphere of activity. Thus, a qualitatively new set of relations is being formed, based on the provision of state and municipal services in electronic-digital format, which is one of the main conditions for increasing the degree of efficiency of publicly functioning entities of administration.

The speed at which artificial intelligence (AI) technology have advanced in recent years has had a profound effect on a number of industries, including local public government. In recent years, there has been a notable expansion in the application of Artificial Intelligence (AI) technology across several domains of local government service delivery [1]. This adoption covers a wide range of services, including transportation management, waste collection and management, water and sewage management, public amenities maintenance, information dissemination to the public, community feedback gathering, and complaint management [2]. Because of local smart city objectives, local

governments are adopting AI technology more and more, thus it is critical to comprehend their ramifications and functions [3]. However, there is a lack of knowledge about the larger story about AI adoption in local governments and its prospects, especially when it comes to sustainable development.

Local governments are looking to artificial intelligence as a means of reducing costs without sacrificing quality of service due to manpower shortages and restricted budgets. AI-based chatbots, for instance, may assist government workers with basic payroll, onboarding, benefits, and other inquiries without requiring them to wait for assistance or using the time of finance, HR, and other staff members. AI-driven self-service solutions can also facilitate people' access to information and usage of governmental services, such as teaching them how to get building permits.

At the moment, a lot of local governments are making the necessary but often sluggish transfer from conventional paper-based systems to digital platforms. AI technology provides a special way to quicken this shift to digitalization. Local governments may swiftly embrace better systems and go through the digitization process more quickly by using AI-driven solutions. Cloud apps are already widely used by municipal governments to speed up a variety of procedures. When AI capabilities are added to these kinds of apps, they not only function more quickly but can also detect trends and provide insights that enhance customer experience since AI can analyze massive amounts of data. AI is used by Pittsburgh's traffic management system to assess important crossings instantly. Using these insights, traffic signal controllers may optimize vehicle flow and minimize engine idle time, contributing to the city's goal of a 50% reduction in transportation-related greenhouse gas emissions by 2030 [4].

AI makes municipal administrations run more smoothly. In addition to speeding up service delivery, it produces a more comprehensive, detailed awareness of community needs. In addition, it can do complex data analysis to assist public managers in making more informed decisions, as well as automate and streamline repetitive administrative activities, saving time and valuable resources. However, there are numerous and substantial obstacles to local governments using digitalization and AI in particular, particularly in the Global South. Digitalization has the potential to revolutionize government services and operations, but it also comes with a number of difficult trade-offs, hidden costs, and hurdles [5]. There are many prospects and opportunities associated with the broad usage of AI in municipal government, but there are also challenges and concerns connected to different ethical considerations. The use of AI technologies in regional and urban governance can present serious difficulties, including the possibility of mass surveillance projects that compromise citizens' privacy and freedom [6]. Additionally, the energy costs and environmental consequences of AI-mediated governance can be extremely high, as advanced AI research, product design, and technology may require enormous computational resources that are only accessible through large computing centers. These facilities have a carbon impact and very high energy requirements [7]. The fact that AI advancements are typically shaped by the requirements and ideals of the countries in which they are being produced is another significant disadvantage of AI-based innovations. AI may incite nationalism, hatred of minorities, and sway election results if big data and AI technologies are applied in areas without democratic oversight, openness, or ethical examination [8]. It is also critical to recognize that access to AI technology varies. For example, small farmers may not have access to sophisticated AI-enhanced agricultural equipment, creating a gap with larger producers in developed economies that impedes the achievement of some SDG2 targets related to ending hunger. Furthermore, if data analysis plays a major role in future markets and these resources are not equally available in high- and low-income nations, the newly created inequities might greatly widen the economic divide. This complexity emphasizes the need for a planned and nuanced approach to digitalization, one that acknowledges both the inherent difficulties and revolutionary possibilities of the technology and calls for extensive study.

2. Literature Review

In the quickly changing technology world of today, digitization is a key factor that is changing the way local governments operate and accelerating the shift of communities toward sustainable futures. The policy brief's section on the transformational power of digitization describes how technology may

strengthen community resilience, improve local government, and expedite the transition to a sustainable and equitable society.

Because digitalization ensures that everyone has access to technology, it has the ability to heal social divisions. Access to technology may be made more widely available through programs like digital literacy, public Wi-Fi areas, and easily accessible internet services. For example, Germany enacted the Online Access Act in 2020, which mandated the digitization of over 500 governmental services in order to make them available online during COVID-19, including government assistance and healthcare [9]. In order to properly empower underrepresented and underserved groups and enable their full participation in society and the digital economy, inclusion is essential. Digital platforms may also help communities engage and participate in local administration by giving them a better way to express their thoughts, get information, and communicate with their representatives [10].

Digitalization may promote sustainable paths throughout several economic sectors and at all governmental levels, from the national to the local. Smart city efforts have the potential to maximize resource use, improve traffic management, augment public safety, and monitor environmental indicators through the utilization of IoT sensors and data analytics. Local governments may greatly enhance the standard of living in metropolitan areas and make a substantial contribution to worldwide environmental objectives, including lowering carbon footprints and encouraging sustainable resource use, by utilizing these technologies. Digitalization in China alone is predicted to cut CO_2 emissions by 10-40% for Chinese enterprises and 12–22% for society by 2030 [11].

As artificial intelligence becomes more widely accepted in the public sector, there is a dearth of comprehensive reviews and knowledge of the opportunities and prospects AI presents for local governments [12; 13]. Although individual papers provide valuable insights into different AI fields related to local governments, there is a discernible deficiency in research that methodically combines the whole range of AI literature concerning local governments. The lack of a thorough synopsis emphasizes the necessity of a thorough analysis, providing local government decision-makers with a chronological comprehension of various real-world applications of AI technology.

Rapid urbanization and shifting policy decisions have made local government more complicated, which has resulted in widespread urban digitalization and changed the way cities are run [14]. According to Vogl et al. [13], local governments are beginning to adopt an algorithm-based bureaucratic structure that will have an impact on public administration and service delivery. Unlike typical software-assisted governance, this algorithmic bureaucracy has a clear emphasis on task automation, including data analysis, resource allocation, and policy enforcement. Algorithmic bureaucracy links algorithms to how technology shapes society, including public administration, law enforcement, healthcare, transportation, and finance, rather than depending solely on human judgment [15].

Though it also presents questions about justice, accountability, and transparency as well as possible biases in algorithmic decision-making systems, algorithmic bureaucracy promises efficiency, consistency, and scalability to public sector procedures [16]. It fits into the larger category of algogracy, or algorithmic governance [17, 18, 19]. This is an example of platform urbanism [e.g., 20; 21], which is algorithmic city mediation made possible by artificial intelligence [22; 23]. Platform urbanism, as a collection of socio-technical constellations of different actors, incorporates digital platforms into urban spaces to enable a range of services and interactions, while algorithmic governance uses AI algorithms to gather, process, and decide on data generated by these platforms, influencing how cities are managed and function. Experts predict the following general directions for AI in the digital transformation of local government (see Figure 1).
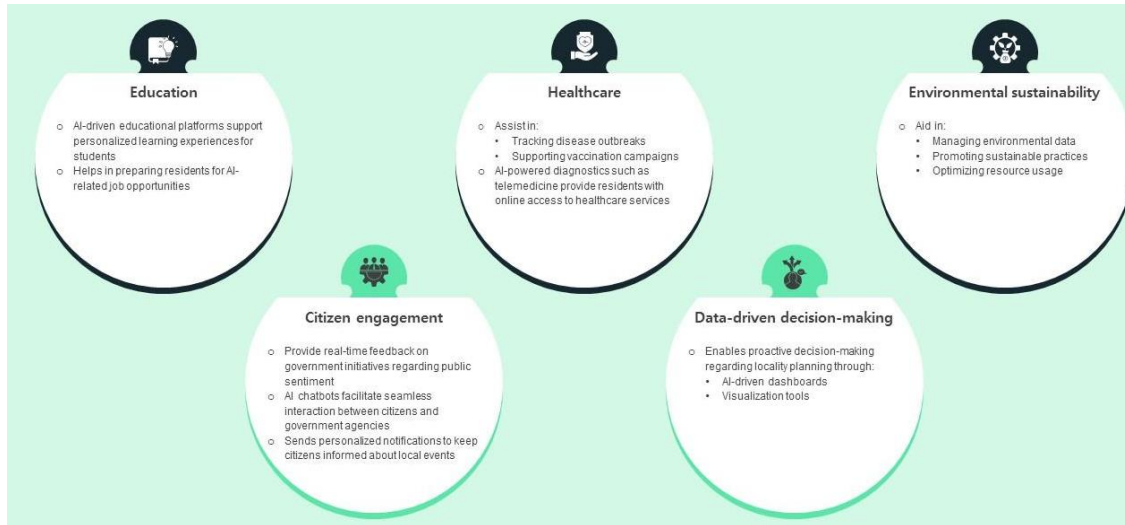
Figure 1.
Future of AI in digital transformation of local government [24].

Furthermore, its implementation in smart cities and urban administration are receiving more attention [25]. This "AI-localism" movement is defined by efforts to increase the application of AI in local governance. Customer service, cybersecurity, policy creation, service delivery, infrastructure management, and help for land use planning decision-making are the main areas where artificial intelligence is being used in local government [26]. including federal governments, local government entities want to improve performance and service delivery while also gaining a number of advantages including increased productivity and efficiency, automated repetitive operations, and evidence-based decision-making.

To improve the administrative effectiveness and public-sector service delivery, local governments are gradually using smart technology and making investments in them [27]. In fact, AI is frequently linked to smart cities, where it may be used in a range of fields and assist administrators in managing growing complexity, such as pandemics. AI, however, has the potential to worsen problems in smart cities by making systems opaquer and more difficult to understand, increasing the vulnerability of infrastructure, and opening the door to "hacking" the city [28; 29].

Thus, there are many possibilities and opportunities associated with the use of AI for a wide variety of applications in local government, but there are also challenges and hazards pertaining to many ethical issues, particularly within the framework of sustainable development. In specifically, Vinuesa et al. [30] discovered that while AI may help achieve 59 aims, it can also hinder the achievement of 134 targets across all Sustainable Development Goals. This was discovered through the use of a consensus-based expert elicitation approach. However, key elements are missed by the present study focus. The rapid advancement of AI must be accompanied by the regulatory understanding and supervision that AI-based technologies require in order to facilitate sustainable growth. If this isn't done, there may be gaps in ethical norms, safety, and openness.

3. Research Methodology
The methodological basis of the study contained applied work on the functioning of modern artificial intelligence technologies, theory of provision and functioning of public administration bodies, provisions of the theory of a digital economy formation, information and resource support for state and municipal administration, electronic and digital support for public-private interaction processes. The study used methods of system analysis, generalization methods, classification, system and structural-functional approaches.

4. Results and Discussion

Artificial Intelligence is widely used for predictive scenarios, automation and efficiency, analytics and decision assistance, and, to a lesser extent, public participation. Prospective advances in Blockchain, GenAI, AVs, UAV, GeoAI, CNN, and XAI are among the prospective applications in security, mobility, surveillance, and modeling that are expected to grow in the future [31]. According to a Deloitte report [32] based on a survey of national, state, and local government leaders, artificial intelligence will be critical to mission outcomes at all levels of government over the coming years (see Figure 2), though local government is still lagging behind the federal and state levels.
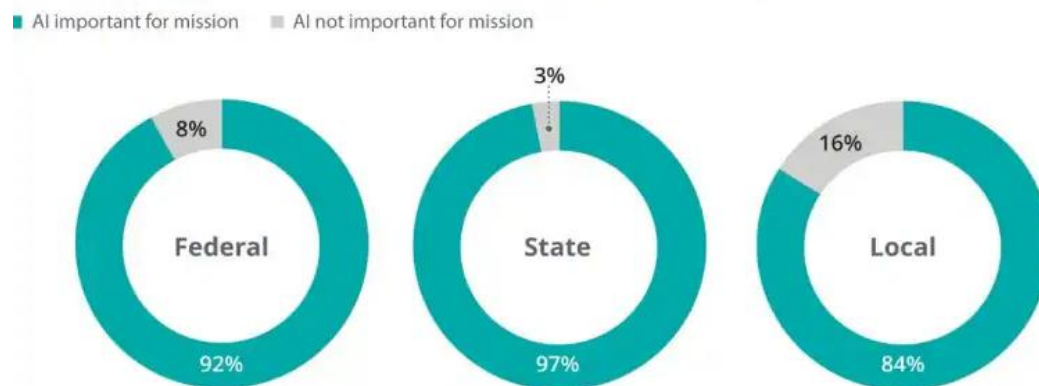

Figure 2.
AI importance to future mission outcomes in various levels of government [32].

AI can assist law enforcement agencies in sifting through vast volumes of data to identify patterns in public safety and deploy resources to prevent crimes. For instance, police can act sooner if they see a spike in break-ins in particular districts. That is just what the San Francisco Police Department is doing, use AI to find connections between instances that at first glance appear unconnected as well as to identify threats. Insights on the socioeconomic elements that contribute to crime are also provided by the department's AI-based assessments, which aid law enforcement in assessing crime-prevention strategies and customizing community policing to each area of the city. Local governments are also using AI to improve security in busy areas like sports stadiums and airports through the ethical use of video surveillance. Jackson Hartsfield Atlanta International Airport relies on AI-powered video systems to track crowd density and optimize staffing. Security lines run more quickly at Amsterdam-Schiphol Airport thanks to AI-enabled scanners that are so accurate that airport staff are not need to ask customers to take computers and safe liquids out of their bags.

Local governments are beginning to use AI to optimize traffic flows. It may be utilized to detect roads in need of repair, dynamically reset traffic signals to avoid lengthy backups, uncover driving trends, and help schedule road maintenance to minimize traffic delays. Australia is piloting an AI system that offers real-time diagnostics; these regions together oversee over 650,000 kilometers of highways [33]. They are informed by the system of the early signs of pavement deterioration that might lead to potholes. An AI-driven chatbot in Chicago interacts with users of public buses to report issues and provide suggestions for enhancements. In the meanwhile, other cities are investigating AI systems that may be used to identify trends in bus and subway usage, forecast passenger volume, plan maintenance for equipment, and suggest modifications to routes in order to save expenses and increase income.

Urban planners are researching the use of AI in prioritization. Its sophisticated algorithms and large-scale data processing assist in the analysis of variables such development project environmental effects, population expansion, transportation patterns, and economic trends. AI analytics may assist planners in determining more cost-effective and environmentally friendly ways to use public resources,

develop infrastructure, and oversee transportation networks by gathering data from sensors, satellites, and social media platforms. Barcelona, for instance, employs AI to reduce costs associated with park and irrigation upkeep. AI-driven digital twins have been developed in Shanghai and Wellington to assist city planners in visualizing development projects and forecasting their effects, such as the effects of a new sports stadium on the neighborhood. AI technologies are making the tedious but crucial task of identifying non-compliant apps and giving immediate feedback better in Sydney, Australia.

AI is used by local governments to analyze data on service utilization and demand trends in order to improve the allocation of healthcare resources. In order to expedite the delivery of services, they also rely on AI chatbots to respond to inquiries about benefit eligibility, application completion, payment options and plans, and other topics. Administratively, GenAI may assist with document summarization, policy and guidance interpretation, and casework inventory reduction. A nonprofit organization called Aspiranet works with thirty counties in California to transition young people from foster care to independent life. Case managers may search through files from different counties and get information that can be used in future cases by using an AI-based natural language processing technology. An AI system is used by Sonoma County, California, to examine anonymised patient discussions, including those involving substance addiction. The technology searches patient records for recently used terms related to medications, assisting case workers in staying informed, identifying warning signs, and taking appropriate action [34].

AI assists local governments in keeping an eye out for air, soil, and water pollution in their localities. Governments can track air pollutants like particulate matter and nitrogen dioxide more quickly and precisely by using artificial intelligence to evaluate data from a variety of smart devices. The Danish city of Aarhus utilizes AI analytics to calculate the carbon emissions of its suppliers, enabling it to redirect funds to more environmentally friendly partners. AI technologies may also increase the efficiency of trash management by streamlining waste collection, enhancing recycling initiatives, and locating high-litter regions. For quicker recycling, Montgomery County, Maryland, uses AI algorithms and infrared technologies to recognize different types of plastic. In order to improve recycling initiatives, reduce garbage collection expenses, and measure and classify waste, Miami, Florida, placed smart cameras in city dumpsters.

AI can assist local governments in predicting natural calamities such as blizzards, wildfires, floods, and droughts. AI can assist in producing simulations of possible future tragedies by sorting through reams of data more quickly than traditional analytics technology. Such an investigation can show, for instance, that specific areas are now more vulnerable to flooding due to climate change. By giving weather stations' real-time updates on atmospheric pressure data, artificial intelligence techniques can also help early warning systems. AI has applications in crisis management as well. AI analytics can deliver quicker, more accurate reporting to accelerate mitigation by analyzing photos from drone or helicopter cameras flying over heavily affected regions. Local responders employed these techniques in 2023 during the rupture of the Kakhovka Dam in Ukraine and the wildfires that devastated Maui.

Governments frequently struggle to fill positions for auditors and other finance workers due to ongoing workforce shortages. In the meantime, only around 5% of fraud involving public funds is discovered by human auditors, according to the Office of the Washington State Auditor. Artificial intelligence (AI) systems can swiftly evaluate large numbers of financial records, identifying inconsistencies in property assessments, payments, invoices, and grant money utilization to assist local governments in addressing these difficulties. These sophisticated talents may be essential since fraudsters can also utilize strong AI technologies. FraudGPT ChatGPT for grifters makes it easy to churn out phishing emails and hijack websites. In addition to streamlining audits, artificial intelligence may assist local governments with budget optimization. In addition to helping governments respond to Freedom of Information Act requests and citizen inquiries about expenditure, AI and GenAI systems may streamline budget-variance analysis, lower costs by automating the development of RFPs and RFIs, and aid with budget narrative writing for both internal and external consumption. An AI-enabled

platform is used by Mt. Lebanon, Pennsylvania, a Pittsburgh suburb, to code and process invoices, cutting down on typical turnaround times from a week to one or two days.

Artificial intelligence (AI) supports local governments in their analysis of social media sentiment, which is a widely used indicator of a program's success or failure. Sentiment research may provide unbiased viewpoints and inform decision-making on a variety of topics, including property tax increases, capital investments in new school construction, and altered flight patterns over residential areas. Local authorities in the Philippines rely on an artificial intelligence system to examine news and social media content in both English and Tagalog, assisting them in comprehending the public's development goals. Furthermore, AI systems are used by public engagement platforms like Polis and Go Vocal (previously CitizenLab) in conjunction with local governments to gather, evaluate, and react to input. Decision-makers can better understand how attitudes might change from one neighborhood to the next by using large language models.

These illustrations demonstrate how the use of AI has the potential to significantly enhance the services that local governments provide. But there is danger involved, so any firm looking to participate in this market needs to strike a balance between enthusiasm and prudence.

Nevertheless, the respondents of the above-mentioned Deloitte survey highlighted the gap between their goals for AI and where they currently assessed their AI capabilities (see Figure 3).
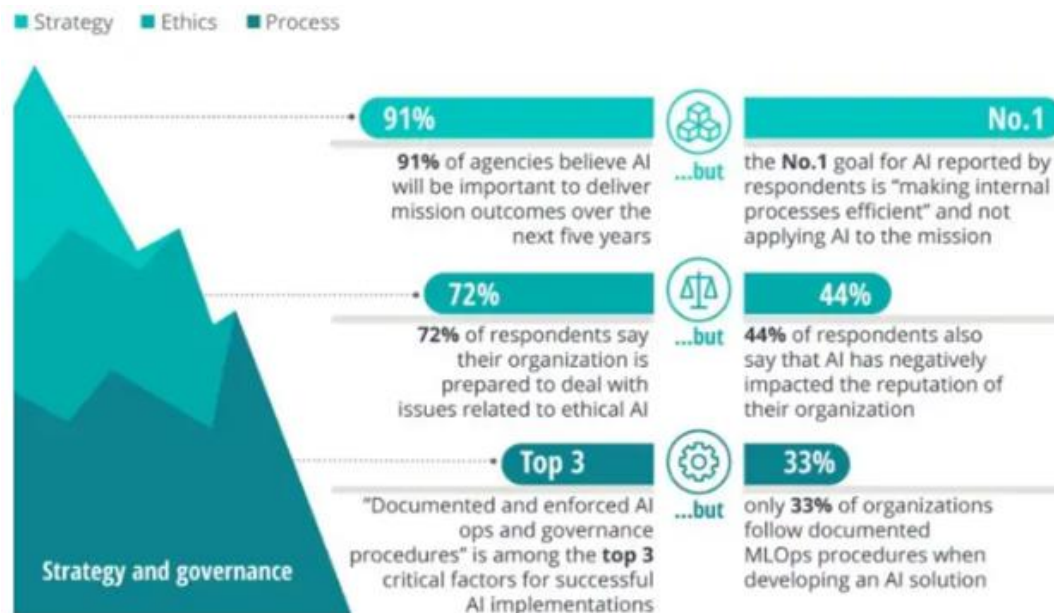

Figure 3.
Gap between current and desired state of AI capabilities, according to self-government leaders [32].

Furthermore, the legal foundation for AI is currently developing on a worldwide scale. In order to manage their AI-driven goods and services properly, organizations need proactively implement "AI Hygiene" procedures. This calls for many crucial actions [35]:

- Carrying out an internal audit to determine which AI-powered products the company and its clients use.
- Gaining a comprehensive grasp of how data is transmitted and utilized within the enterprise. This study is essential for figuring out whether information barriers or organizational restraints are required to reduce privacy hazards.
- Analyzing the state of the law as it relates to AI. Make use of these observations to assess and revise any pertinent policies and procedures. This entails making certain that rules pertaining to

information security, privacy, and consumer interaction are appropriate and compliance with current laws.

- Using best practices in AI development by following global guidelines established by organizations like the ISO and NIST.
- Examining client contracts to make sure that, in the context of the pertinent AI goods, privacy, responsibility, indemnification, and intellectual property rights are sufficiently addressed.

Although AI-powered training and development tools are still in their infancy, the technology has the potential to tailor training according to the learning preferences of employees. Certain technologies have the ability to suggest modifications in the middle of training by observing how staff members engage with learning models. AI solutions may help employees learn by offering practice sessions and personalized information if they are struggling with a particular concept. Localities can also benefit from matching people with employment opportunities through AI-based automation. King County, Washington, uses a method like this to analyze applicant profiles and job needs more thoroughly. It does this by looking at intangibles like cultural fit in addition to abilities and experience. Government recruiters can locate the top applicants faster and more efficiently with the use of such analysis. Such methods can also assist in eliminating bias in government employment choices as communities work to satisfy diversity and inclusion goals [33].

The advancement of the SDGs is being expedited by a variety of technological capabilities that are included in AI. According to Gosselink et al. [36], AI skills are assisting leaders and social impact organizations in processing large volumes of data in order to better focus interventions, identify issues and their causes, and create new ways of interacting with communities and frontline workers. Table 1 provides examples of AI applications matched to the Sustainable Development Goals within local government.

Table 1.
Illustrative use cases of AI mapped to SDGs [36].

SDG	How AI could help (Not exhaustive)
SDG 1: No poverty	- In places without survey data, machine learning using satellite images and survey data may extract socioeconomic variables to provide poverty projections and visualizations. - Financial data may be analyzed by Natural Language Processing to provide customized financial advice (AI chatbots offering financial counseling to marginalized communities). - Automation, greater productivity, and creativity are some of the ways that AI technology might support economic development and employment creation.
SDG 2: Zero hunger	- To maximize crop production, image classification can track the health of the soil and crops (foreseeing insect incursions, analyzing seed and soil in real time, and managing weeds). - Multimodal analysis can improve distribution and reduce food waste to build intelligent supply chains. - By utilizing satellite images, localized food prices, and conflict data, machine learning may anticipate and mitigate severe acute childhood malnutrition as well as forecast food insecurity for prompt intervention.
SDG 3: Good health and well-being	- In order to lower morality rates, medical image analysis can improve the precision of illness detection and diagnosis. - By using speech recognition technology, clinical notes and doctor-patient exchanges may be transcribed, saving time on paperwork and

	enabling medical staff to concentrate more on patient care.
	• Personalized therapy for chronic illnesses may be obtained through reinforcement learning, which adjusts therapies depending on individual responses to enhance health outcomes.
	• In order to increase accessibility, assistive robots and robotic exoskeletons can help the elderly and others with impairments.
SDG 4: Quality education	• Teachers may create lesson plans, customize learning resources, and dynamically modify instruction based on real-time feedback with the use of AI-powered tools.
	• AI-powered multimodal instructional software can adjust to various learning styles, resulting in more inclusive and efficient learning environments.
	• By combining machine learning analytics on parent and student profiles with natural language processing on conversations between educators and non-English speaking parents, it is possible to create a multilingual family engagement platform and provide tailored resources that support parents in communicating with teachers online in any language.
SDG 5: Gender equality	• Gender bias in recruiting algorithms may be identified via machine learning.
	• Chatbots with generative AI capabilities can help those in need by offering individualized chats, mental health support, and assistance.
	• To escalate calls with a high risk of intimate partner abuse, natural language processing techniques like topic modeling, psycholinguistic feature modeling, and audio signal processing can be used on voice recordings and chat transcripts from crisis call hotlines for women.
SDG 6: Clean water and sanitation	• AI-enhanced water infrastructure management can maximize use and stop leakage.
	• Deep learning and big data analysis can forecast food shortages and droughts, improving water management.
	• By using meteorological, agricultural, and thermal satellite data, machine learning algorithms can predict evapotranspiration and assist farmers in providing more accurate irrigation water levels.
SDG 7: Affordable and clean energy	• Energy distribution may be optimized for smart grid management using reinforcement learning.
	• AI, particularly ML and CV, has the potential to improve the dependability and efficiency of the electrical grid.
	• A framework for wind turbine monitoring and maintenance may be created using predictive analysis.
SDG 8: Decent work and economic growth	• Chatbots with artificial intelligence (AI) capabilities may automate monotonous jobs and enhance data collecting, freeing up human resources for more valuable work.
	• Artificial intelligence (AI) can evaluate sensor and video data to spot possible safety risks and stop workplace mishaps.
	• Using publicly accessible skills and occupational data, machine learning analytics may be used to immediately correlate a person's skill set from a guided exam with appropriate careers.

SDG 9: Industry, innovation, and infrastructure	• To enhance product quality, Computer Vision may identify flaws in manufacturing processes. • By examining past data and market patterns, predictive analytics algorithms can estimate the demand for raw materials, components, and completed goods. • Homeowners may analyze defensible space and locate combustible plants surrounding their homes with the use of computer vision on Google Street View and LIDAR pictures.
SDG 10: Reduced inequalities	• Hearing-impaired people can benefit from assistive audio-visual speech recognition. • For those who are blind or visually impaired, assistive devices can give audio descriptions of their surroundings. • By using machine learning to text and picture data, a dictionary of norm-revealing words may be created. This vocabulary can be utilized as a substitute for traditional credit scoring methods, therefore increasing the accessibility of consumer loans for low-income people.
SDG 11: Sustainable cities	• By simulating peripheral vision, machine learning models can increase driving safety. • In disaster-affected areas, robots with sensors and cameras can help with search and rescue efforts and provide vital supplies. • Reinforcement learning has the potential to improve traffic flow while lowering emissions and congestion. • By utilizing machine learning analytics on incident dispatch data together with other correlating data (weather, unusual occurrences, city demographics, etc.), it is possible to create a prediction model for first responders' emergency response times in metropolitan regions.
SDG 12: Responsible consumption and production	• AI-guided product design can advance circularity and sustainability. • By matching supply and demand, predictive analytics can minimize overproduction. • Automating the categorization and sorting of recyclables at waste management facilities can be facilitated by deep neural networks and image recognition technologies applied to garbage and waste management photos.
SDG 13: Climate action	• Traffic flow, anti-pollution, and energy distribution and consumption may all be optimized by reinforcement learning. • Power plant emissions may be tracked using machine learning analytics and computer vision on emissions data, satellite imaging of power plants, weather, and grid conditions.
SDG 14: Life below water	• By monitoring submerged creatures and identifying pollution sources, image and acoustic categorization can assist in cleaning up pollutants and protecting marine habitats for the protection and preservation of these ecosystems. • To support enforcement and conservation initiatives, picture classification and satellite imagery analysis may be used to track fish populations and identify illicit fishing operations. • Using image recognition technology on data and photographs from

	trash facilities, recycling rates can be raised and ocean plastic pollution may be decreased.
SDG 15: Life on land	• Satellite imagery can identify deforestation to maintain terrestrial ecosystems. • Poaching operations may be detected and endangered species can be identified using remote sensing. • Analytical machine learning and audio identification from rainforests and other environments can assist communities in gaining knowledge and identifying potential ecological hazards.
SDG 16: Peace, justice and strong institutions	• In multilingual communities, NLP can detect thoughts and feelings about social issues by analyzing data from social media. • NLP and computational statistics help quantify and identify trends in online abuse. • NLP and other machine learning techniques can strengthen human rights activists by extracting pertinent data from legal and judicial documents (such as legislation, jurisprudence, victim testimonials, and decisions).
SDG 17: Partnerships	• By evaluating data from various sources, AI-powered platforms can assist in the development of monitoring systems for compliance with SDG objectives. • A vast amount of scientific literature, patents, and technical papers may be analyzed and synthesized by integrating NLP algorithms into collaborative research platforms. • Governments, businesses, and organizations in the public and private sectors may more effectively target aid and calculate return on investment by using machine learning analytics on demographic survey data and economic indicators for developing nations.

The Italian Presidency's plan to construct the AI Hub for Sustainable Development in partnership with UNDP was warmly received at the G7 Leaders' Summit in June 2024. The G7 Leaders' Declaration states that the AI Hub's objectives are to improve capacity to advance AI for sustainable development, facilitate multi-stakeholder collaborations to promote local AI digital ecosystems, and supplement current efforts like the AI for Development Donors Partnership [37]. This was the first report on the AI Hub's co-design to be made public. It presents preliminary recommendations and aggregated input from regional AI ecosystems to comprehend prospects and improve current AI development projects. In addition to fostering partnerships and responsible private sector innovation in the key areas of data pipelines, computational power, and talent that underpin AI's potential for sustainable development, the AI Hub for Sustainable Development seeks to fortify local AI ecosystems within African nations. In order to guarantee tight cooperation with partners working on AI governance and its applications locally, the AI Hub will function in tandem with governments and local ecosystems. The purpose of the AI Hub is to facilitate paradigm changes in the African context. In order to accomplish sustainable development in Africa, it will combine efforts between private sector investments and innovation, as well as the guidance and governance provided by the government and civil society. It is simple to attract investment in this field: for every improvement in local ecosystems' AI capabilities by the private sector, equal coordination and collaboration are required for the study and creation of systems that minimize potential risks.

Over the last several years, AI has moved away from the use of numerous tiny models, each taught to do a separate task – for example, detecting photos, drawing them, or annotating them – and toward single, monolithic models that are trained to perform all of these functions as well as additional ones

[38]. The corporate community has already made significant adaptations. Local governments are generally commended for being more responsive to the demands of their communities, even though public institutions take longer to adjust.

"Digital twins" have also begun to be used by cities. This idea goes a step further by providing a comprehensive framework for sustainable urban design. The integration of digital technology, such as AI-powered algorithms, with urban operational processes presents a promising avenue for immediate transition to future-proof urban upgrading. It contributes to the creation of more low-carbon, sustainable settings and encourages safer, more effective urban activities as well as more convenient, inclusive daily services through the accurate mapping, virtual-real integration, and intelligent feedback of physical and digital cities [39].

Since smart cities are the result of disruptive breakthroughs, they are especially vulnerable to the disruptive nature of artificial intelligence. Cities must, however, exercise caution to guarantee that all of their resident's profit from technology advancements. From online services to growing citiverses, smart and sustainable cities need strong foundations. They must be able to apply AI applications across land use, business development, urban management, data analytics, and environmental sustainability while using data responsibly and addressing the need for local public services.

Even though AI has a lot of potential for local governments, there are a few issues that need to be resolved. Because access to vast volumes of data is necessary for the effective use of AI, issues regarding data security and privacy of citizens are raised. Strong data protection policies must be established by local governments to guarantee that private information is handled appropriately [50] AI systems should be developed and put into use with the goal of providing fair access and advantages to all community members, especially marginalized groups that might not have had as much access to technology in the past. The decisions made by AI systems affect the life of the population. It is imperative that local governments uphold accountability measures and openness in the functioning of these systems. The integration of artificial and human intelligence is important in order to effectively tackle the challenges posed by urbanization and to realize intelligent and sustainable growth.

Furthermore, research shows that the rising ubiquity of AI deviates from the same levels of comprehension and awareness, especially among marginalized communities. Understanding how to employ AI to benefit lives is being stifled by fear of AI-biased conclusions and bad effects. In the workplace, women are more likely than males to be exposed to AI-related employment changes, but they still have a sizable skills gap. "Are you concerned AI will impact your job?" was a question posed during focus groups on AI that the California governor's office recently hosted in the community. "I don't know, should I be?" was the response. [40]. The issue is reflected in this response. Very few people are aware of how AI affects daily life. This discrepancy highlights the critical requirement for focused AI literacy initiatives to assist marginalized populations. Therefore, it is obvious that we need to support neighborhood-based programs that advance AI literacy [41-49]. Reliable local sources work better than faceless internet tools to allay anxieties and foster understanding. Online AI literacy that is centered on technology products could not be successful because of mistrust. Initiatives for AI literacy led by the community are essential.

5. Conclusion

It is anticipated that local government will employ AI much more frequently. It might be applied to provide more individualized public service experiences that cater to the unique requirements of people or communities, improving the efficacy of initiatives in the social services, healthcare, and education sectors. It is often believed that in smart cities and other local communities, artificial intelligence and technology related to AI would improve public health and economic prosperity. Local and regional governments (LRGs) ought to implement these technologies, but only insofar as they support the public mission of LRGs and improve the standard of living and citizen requirements. AI and AI-enabled solutions open up new avenues for service delivery and promote forward-thinking municipal (especially urban) development, but in order to do this, local governments need to take a people-centered approach.

AI and other technologies can serve a common purpose provided their deployment respects human rights and support sustainable development. Local governments need to invest in both capacity building and meeting international standards in order to ensure they are fully equipped to govern, collect and analyze data, adopt and deploy AI-led solutions, and strike an appropriate balance between technological opportunities and socio-economic needs. They might get assistance from international groups in this difficult task.

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References

[1]   S. Mikhaylov, M. Esteve and A. Campion, "Artificial intelligence for the public sector: opportunities and challenges of cross-sector collaboration," Philosophical Transactions of the Royal Society a: mathematical, physical and engineering sciences, 376(2128), Article 20170357, 2018.
[2]   Hodgkinson et al., "Toward a public service management: past, present, and future directions," Journal of service management, 28(5), pp. 998-1023, 2017.
[3]   A. Buchelt et al. "Exploring artificial intelligence for applications of drones in forest ecology and management," Forest Ecology and Management, 551, Article 121530, 2024.
[4]   Ch. Chiancone, Smart Government: Practical Uses for Artificial Intelligence in Local Government. Munich, GRIN Verlag, 2023.
[5]   F. Nwaiwu, "Digitalisation and sustainable energy transitions in Africa: assessing the impact of policy and regulatory environments on the energy sector in Nigeria and South Africa," Energy, Sustainability and Society, 11, Article 48, 2021.
[6]   Y. Xu et al., "The Emergence of Artificial Intelligence in Anticipatory Urban Governance: Multi-Scalar Evidence of China's Transition to City Brains," Journal of Urban Technology, pp. 1-25, 2024. https://doi.org/10.1080/10630732.2023.2292823
[7]   O. Palmini and F. Cugurullo, "Charting AI urbanism: conceptual sources and spatial implications of urban artificial intelligence," Discover Artificial Intelligence, 3(1), Article 15, 2023.
[8]   Helbing, D. et al.,Towards Digital Enlightenment. New York, Springer International Publishing, 2019.
[9]   P. Parviainen, M. Tihinen, J. Kääriäinen, and S. Teppola, "Tackling the digitalization challenge: how to benefit from digitalization in practice," International Journal of Information Systems and Project Management, 5(1), pp. 63-77, 2022.
[10]   Digitalization: A Game Changer for Local Governments & Communities. ICLEI. Policy Brief. 2023. https://iclei.org/wp-content/uploads/2023/12/2022-Academy-Digitalization-Policy-Brief-ICLEI.pdf
[11]   R. Zheng et al., "How does digitalization drive carbon emissions? The inverted U-shaped effect in China," Environmental Impact Assessment Review, 102, Article 107203, 2023.
[12]   R. Madan and M. Ashok, "AI adoption and diffusion in public administration: A systematic literature review and future research agenda," Government Information Quarterly, 40(1), Article 101774, 2023.
[13]   T. Vogl, C. Seidelin, B. Ganesh, J. Bright, "Smart technology and the emergence of algorithmic bureaucracy: Artificial intelligence in UK local authorities," Public Administration Review, 80(6), pp. 946-961, 2020.
[14]   Z. Allam and Z. Dhunny, "On big data, artificial intelligence and smart cities," Cities, 89, pp. 80-91. 2019.
[15]   D. MacKenzie and J. Wajcman, The social shaping of technology. Milton Keynes, Open University, 1999.
[16]   D. Brand, "Responsible artificial intelligence in government: Development of a legal framework for South Africa," JeDEM-eJournal of eDemocracy and Open Government, 14(1), pp. 130-150, 2022.
[17]   S. Bibri, E., J. Huang, S. Jagatheesaperumal, J. Krogstie, J., "The synergistic interplay of artificial intelligence and digital twin in environmentally planning sustainable smart cities: a comprehensive systematic review," Environmental Science and Ecotechnology, 20, Article 100433, 2024.
[18]   S. Issar and A. Aneesh, "What is algorithmic governance?," Sociology Compass, 16(1), Article e12955, 2022.
[19]   L. Lorenz, A. Meijer, T, Schuppan, "The algocracy as a new ideal type for government organizations: Predictive policing in Berlin as an empirical case," Information Polity, 26(1), pp. 71-86, 2021.
[20]   C. Ansell and A. Gash, A., "Collaborative platforms as a governance strategy," Journal of Public Administration Research and Theory, 28(1), pp. 16-32, 2018.
[21]   A. Haveri and A. Anttiroiko, "Urban platforms as a mode of governance," International Review of Administrative Sciences, 89(1), pp. 3-20, 2023.
[22]   S.E. Bibri et al., "Smarter eco-cities and their leading-edge artificial intelligence of things solutions for environmental sustainability: A comprehensive systematic review," Environmental Science and Ecotechnology, 19, Article 100330, 2024.

[23]   F.R. Ishengoma et al., "Integration of artificial intelligence of things (AIoT) in the public sector: Drivers, barriers and future research agenda," Digital Policy, Regulation and Governance, 24(5), pp. 449-462, 2022.

[24]   V. Shekhar, Generative Artificial Intelligence Use Cases in State & Local Governments: Scratching the surface of the "Why" & "How" to initiate implementing through the lens of 100 use cases. Munich, GRIN Verlag, 2023.

[25]   F. Cugurullo et al. (Eds.), Artificial intelligence and the city: Urbanistic perspectives on AI. Milton Park, Taylor & Francis, 2023.

[26]   T. Yigitcanlar et al., "Artificial intelligence in local government services: Public perceptions from Australia and Hong Kong," Government Information Quarterly, 40(3), Article 101833, 2023.

[27]   R.M. Soe nad W. Drechsler, "Agile local governments: Experimentation before implementation," Government Information Quarterly, 35(2), pp. 323-335, 2018.

[28]   G. D'Amico et al., "Understanding sensor cities: Insights from technology giant company driven smart urbanism practices," Sensors, 20(16), Article 4391, 2020.

[29]   H. Herath and M. Mittal, "Adoption of artificial intelligence in smart cities: A comprehensive review. International Journal of Information Management Data Insights, 2(1), Article 100076. 2022.

[30]   R. Vinuesa et al., "The role of artificial intelligence in achieving the Sustainable Development Goals," Nature Communications, 11, Article 233, 2020.

[31]   T. Yigitcanlar et al., "Unlocking Artificial Intelligence Adoption in Local Governments: Best Practice Lessons from Real-World Implementations," Smart Cities, 7, pp. 1576-1625, 2024.

[32]   E. Buren et al., "Scaling AI in government," Deloitte. 2021, December 13. https://www2.deloitte.com/us/en/insights/industry/public-sector/government-ai-survey.html

[33]   M. Jackley, "Using AI in Local Government: 10 Use Cases," OCI. 2024. https://www.oracle.com/artificial-intelligence/ai-local-government/

[34]   V.-D. Păvăloaia and S.-C. Necula, "Artificial Intelligence as a Disruptive Technology - A Systematic Literature Review," Electronics, 12, Article 1102, 2023.

[35]   S. Colman, "Business Advisory: How AI can be used in local government in 2024," DLA Piper. 2024. https://www.dlapiper.com/en/insights/publications/2024/01/how-ai-can-be-used-in-local-government-in-2024

[36]   B. Gosselink et al., "AI in Action: Accelerating Progress Towards the Sustainable Development Goals," 2024. https://static.googleusercontent.com/media/publicpolicy.google/ru//resources/research-brief-ai-and-SDG.pdf

[37]   AI Hub for Sustainable Development. UNDP. 2024. https://www.undp.org/publications/ai-hub-sustainable-development-strengthening-local-ai-ecosystems-through-collective-action

[38]   M. Heikkilä and W. Heaven, "What's next for AI in 2024," MIT Technology Review. 2024. https://www.technologyreview.com/2024/01/04/1086046/whats-next-for-ai-in-2024/

[39]   Digital Twin Cities: Framework and Global Practices. 2022. April 20. WEF. https://www.weforum.org/publications/digital-twin-cities-framework-and-global-practices/

[40]   AI literacy and the new Digital Divide, UNESCO. 2024, August 6. https://www.unesco.org/en/articles/ai-literacy-and-new-digital-divide-global-call-action

[41]   L. Avedyan, et al., "The effectiveness of the development of territories in the state regional system politicians," Financial and Credit Activity: Problems of Theory and Practice, 4(51), pp. 333-344, 2023.

[42]   L. Gaievska, et al., "State Policy of Cultural and Art Projects Funding as a Factor in the Stability of State Development in the Conditions of Globalization," Economic Affairs (New Delhi), 68(01s), pp. 199-211, 2023.

[43]   P. Gaman, et al., "Institutional Platform to Ensure the Interaction between the Subjects of Combating Medical and Biological Emergencies Mechanism," Economic Affairs (New Delhi), 67(04s), pp. 765-775, 2022.

[44]   A. Kondur et al, "Economic and environmental component in the field of sustainable development management," Quality, 25(201), pp. 7-14. 2024. DOI: 10.47750/QAS/25.201.02

[45]   K. Kussainov et al., "Anti-corruption Management Mechanisms and the Construction of a Security Landscape in the Financial Sector of the EU Economic System Against the Background of Challenges to European Integration: Implications for Artificial Intelligence Technologies," Economic Affairs (New Delhi), 68(1), pp. 509-521, 2023.

[46]   V. Nekhai et al., "Economic Consequences of Geopolitical Conflicts for the Development of Territorial Communities in the Context of Economic and National Security of Ukraine," Economic Affairs (New Delhi), 69 (1), pp. 551-563, 2024.

[47]   G. Ortina et al., "Economic Efficiency of Public Administration in the Field of Digital Development," Economic Affairs (New Delhi), 68(3), pp. 1543-1553, 2023.

[48]   O. Sydorchuk et al., "Integrating digitization into public administration: Impact on national security and the economy through spatial planning," Edelweiss Applied Science and Technology, 8(5), pp.747–759. 2024.

[49]   D. Zayats et al., "Economic Aspects of Public Administration and Local Government in the Context of Ensuring National Security," Economic Affairs (New Delhi), 69(2), pp. 979-988. 2024.

[50]   V. Yermachenko et al., "Theory and Practice of Public Management of Smart Infrastructure in the Conditions of the Digital Society' Development: Socio-economic Aspects," Economic Affairs (New Delhi), 68(1), pp. 617-633, 2023.