

Use of Artificial Intelligence Technology in Local Governments and Examples from Türkiye

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Abstract: This study examines the use, adoption, implementation, and impact of artificial intelligence (AI) technologies in local governments in Türkiye. In this study, national strategy reports, municipal activity reports, academic literature, and official public documents published between 2020 and 2025 were evaluated using qualitative document analysis. The study investigated how AI supports operational efficiency, urban transportation, disaster risk management, and citizen participation in Turkish municipalities. The findings indicate that metropolitan municipalities, such as Istanbul, Ankara, and Izmir, are actively utilizing AI technologies to optimize resource management, enhance service delivery, and improve decision-making processes. However, the study reveals a significant difference in AI adoption between metropolitan municipalities and smaller municipalities; small-scale local governments are less likely to implement AI applications due to their lack of technical infrastructure, financial resources, and human resources. It was determined that AI has fallen behind. It was also emphasized that ethical issues such as data privacy, algorithmic transparency, and the protection of digital rights have not been adequately addressed in current practices. In conclusion, it was demonstrated that AI has high potential to transform local government services in Türkiye; however, coordinated strategies and support programs at the national level are necessary for this transformation to be sustainable and inclusive. By emphasizing the importance of infrastructure development, human resource investments, and ethical governance principles, the study provides valuable information for policymakers and academics in the fields of digital transformation and smart governance.

Keywords: Local Governments, Artificial Intelligence, Smart Cities, Digital Transformation, Türkiye

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1. Introduction

Artificial intelligence is one of the leading technological advancements that has radically transformed today's understanding of public and local administration. As we enter the second quarter of the 21st century, increasing global urbanization, the efficient use of resources, shifting citizen expectations, and pressure from digitalization are forcing public institutions to develop faster, data-driven, and sustainable solutions. In this context, local governments, due to their direct interaction with citizens, stand out as a potential application area for technology-based innovations (Wirtz, Weyerer, & Geyer, 2019). During this transformation, AI has become one of the fundamental tools that enable local governments to make more effective decisions, manage their resources more efficiently, and strengthen their public relations.

AI enables automation and personalization in service delivery through techniques such as machine learning, natural language processing, image recognition, and predictive analysis (Russell & Norvig, 2020). For local governments, the use of these technologies has a wide range of applications, from traffic density prediction to the optimization of waste collection routes, from the prioritization of social assistance applications to disaster management (OECD, 2024). These technologies are also directly related to the principles of open data, transparency, participation, and accountability. Therefore, it can be said that AI technologies offer not only a technical but also a governance paradigm shift.

In Türkiye, the use of AI technologies in local governments is being shaped within the framework of the digital state vision. The "National Artificial Intelligence Strategy (2021–2025)" document, published in 2021, included among the priority goals the dissemination of AI technologies in public administration and the integration of local governments into this process. In this context, projects carried out by municipalities such as Istanbul, Konya, Gaziantep, and Kadıköy offer concrete examples of local AI applications in Türkiye. However, most of these applications are limited-scope pilot projects and



struggle to produce lasting solutions due to reasons such as sustainability, insufficient human resources, and data infrastructure deficiencies (Kaya et al., 2025).

According to the literature, the most significant challenges faced by local governments in developing digital capacity include data security, algorithmic transparency, compliance with ethical principles, and a lack of citizen participation (Zouridis, van Eck, & Bovens, 2020). Furthermore, the lack of homogeneity in technological infrastructure leads to large disparities in the level of digitalization across municipalities. This, in turn, hinders the balanced and equitable expansion of AI use across the country.

The research shows that citizen-centric municipal governance is possible not only through the rapid and automated delivery of services but also by increasing participation in decision-making processes and strengthening public trust (Tomer, Fishbane, Siefer, & Callahan, 2020). In this context, AI technologies can improve the performance of local governments while also supporting democratic participation. However, during this transformation process, municipalities need to restructure both their institutional capacity and governance principles.

This study aims to investigate the purposes, implementation strategies, and effectiveness of artificial intelligence technologies in local governments across Türkiye, while also identifying the key challenges associated with their use. Drawing on a literature review, qualitative content analysis, and case study methodology were used to evaluate the local-level impacts of AI and inform strategic policy development in this field. The main objective is to deliver a comprehensive assessment of the application areas, performance, and sustainability of AI technologies within the framework of local governance in Türkiye. In line with the stated main objective, the following sub-objectives will be examined:

- To determine the types, scope, and service areas of AI applications developed by different municipalities in Türkiye,
- To evaluate the impacts of AI-enabled services on citizen satisfaction, service quality, and governance,
- To identify the fundamental problems that local governments face during AI applications, such as infrastructure, ethics, human resources, and financing.
- Develop strategic policy and practice recommendations for the dissemination of AI use at the local level in Türkiye.

2. Literature Review

Artificial intelligence is a technology that allows machines to mimic human-like thinking, learning, problem-solving, and decision-making abilities. First introduced by John McCarthy in 1956, this concept is now effectively used in a wide variety of application areas (Russell & Norvig, 2020). With its subcomponents such as machine learning, deep learning, natural language processing, and image processing, AI systems offer significant advantages, particularly in areas where decision-making processes are intense, such as public administration and local governments (Kaplan & Haenlein, 2019).

2.1. The Role of Artificial Intelligence in Public Administration

The use of AI in public administration enables the development of data-driven decision-making processes and contributes to faster, more effective, and more personalized services provided to citizens (Wirtz et al., 2019). Thanks to AI technologies, municipalities and local governments can create more efficient policies in areas such as traffic management, waste collection, environmental monitoring, energy use, and disaster management (Sun & Medaglia, 2019).

The 2022 e-Government Development Report, published by the United Nations, states that many countries are striving to increase local government capacity through AI-based services (UN DESA, 2022). In this context, AI applications in local governments not only increase operational efficiency but also public trust and citizen satisfaction (Zouridis et al., 2020).

2.2. Smart Cities and AI Integration

One of the most common uses of AI technology in local governments is smart city applications. Smart cities are systems that aim to improve the quality of urban life by using information and communication technologies (ICT). In this context, AI is used in many areas, such as urban planning, transportation optimization, energy efficiency, security systems, and environmental sustainability (Batty et al., 2012).

Barcelona, one example of a smart city, has managed to reduce traffic congestion by 20% thanks to AI-based sensor systems (Cocchia, 2014). Singapore, on the other hand, is effectively using AI in many areas, from public transportation to the healthcare system, as part of its "Smart Nation" project (Kitchin, 2015).

2.3. Advantages of Using AI in Local Governments

In the literature, the advantages of artificial intelligence in local governments are grouped under four main headings:

Operational Efficiency: Artificial intelligence contributes greatly to the efficient use of resources and the timely delivery of services (Brynjolfsson & McAfee, 2017).

Citizen-Centric Service Delivery: AI-powered chatbots and decision support systems provide fast and effective solutions to citizens' demands (Misuraca & van Noordt, 2020).

Data-Driven Policies: AI, which enables big data analysis, provides local administrators with tools to make more accurate decisions (OECD, 2024).

Crisis and Disaster Management: Especially in disaster situations such as earthquakes and floods, AI-based early warning systems provide rapid response (Andrae & Tariq, 2025).

3. Artificial Intelligence Applications in Local Governments

Local governments in Türkiye, particularly at the metropolitan municipality level, are investing in artificial intelligence and smart city projects. In line with its "Smart City Istanbul" vision, the Istanbul Metropolitan Municipality (IMM) has developed various AI applications in areas such as transportation, energy, environment, and disaster management. For example, the IMM Traffic Control Center monitors traffic flow and makes routing decisions using AI algorithms (Tetikol, 2025).

Ankara Metropolitan Municipality aims to reduce water losses by 30% by installing AI-supported sensor systems to detect water leaks (Toy, 2025). Konya Metropolitan Municipality, on the other hand, is expanding AI applications in agriculture and environmental management, using satellite imagery and machine learning techniques to increase the productivity of agricultural areas (Karaçor & Topçu, 2025).

Additionally, within the scope of the "National Artificial Intelligence Strategy (2021-2025)" conducted by the Digital Transformation Office of the Presidency of the Republic of Türkiye, it is aimed to support projects that will contribute to the digital transformation of local governments (T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 2021). As part of this strategy, guidance is provided for municipalities on digital capacity building, data management, and ethical use of artificial intelligence.

3. 1. Challenges and Ethical Controversies

While AI offers significant opportunities for local governments, it also presents challenges. There are significant debates, particularly regarding data privacy, algorithmic bias, transparency, and accountability (Crawford, 2021). Furthermore, local governments' lack of technical infrastructure, inadequate human resources, and regulatory incompatibility are key factors limiting the widespread adoption of AI applications (Tuğaç, 2025).

The lack of clarity in the ethical and legal framework leads to various problems, especially in terms of the impact of decision support systems on public policies. The explainability and auditability of algorithmic decision-making processes are important for democratic governance (Floridi & Cowls, 2019).

3.2. Future Perspective

In the future, artificial intelligence technologies are expected to support more inclusive, transparent, and data-based decision-making processes in local governments. However, for this transformation to proceed smoothly, legislative changes, human resource development, and ethical frameworks must be established. Türkiye's strategic planning in this area has the potential to accelerate the technological transformation of local governments.

4. Method

4.1. Research Model

This research was conducted using a qualitative research design to reveal the current use of artificial intelligence technology in local governments and to analyze exemplary practices from Türkiye. Document analysis was used to systematically examine official reports, strategy documents, academic publications, press releases, and content on digital platforms. The research analyzes the current situation using a descriptive approach and aims to evaluate general trends based on the findings (Creswell & Poth, 2018).

4.2. Data Collection Method

The data collection process utilized national strategy documents published between 2020 and 2025 (e.g., the National Artificial Intelligence Strategy), municipal activity reports, presentations by metropolitan municipalities on smart city projects, relevant laws and regulations, and peer-reviewed articles in academic databases. Furthermore, TÜBİTAK, the Union of Turkish Municipalities, the Digital Transformation Office of the Presidency of the Republic of Türkiye, and the official websites of relevant local governments were among the primary sources providing data for the research. The following criteria were taken into consideration during data selection:

- The document must have been published in 2018 or later.
- The document focuses directly on the relationship between local governments and artificial intelligence technology.
- Contains valid and reliable information in the Turkish context
- Publicly accessible
- The documents obtained in the research were systematically classified and collected under themes using content analysis. The data obtained from the documents were organized in an Excel spreadsheet and analyzed for similarities and differences.

4.3. Data Analysis

The document analysis process was based on the evaluation of qualitative data using descriptive analysis. In this context, the application areas of AI use in local governments (e.g., transportation, environmental management, disaster management), the technologies used (machine learning, image processing, etc.), the scope of the application (e.g., pilot project, system integration, citizen interaction), and the results (e.g., increased efficiency, service quality, citizen satisfaction) were determined as the main analysis categories.

In line with these categories, the contents of each municipality's document were examined separately, and the resulting data were coded under themes. The coding process was conducted independently by two researchers, and then a consensus was reached between the codes through comparative analysis. Inferences were drawn from the most frequently repeated patterns among the codes, and trends in Türkiye were generally described.

4.4. Validity and Reliability

Three basic strategies were followed to ensure reliability and validity criteria in the research:

Data Diversity: Care was taken to diversify the data set by utilizing different types of documents (official reports, academic publications, web content) (Patton, 2002).

Intercoder Reliability: The involvement of two independent researchers in the coding process and the conduct of analyses by consensus increased reliability.

Verifiability: The sources of all documents used in the research are clearly stated, and the analysis process is structured transparently.

Thanks to these approaches, the internal consistency and external validity of the research findings were maintained at a high level. Furthermore, to ensure the ethical integrity of the study, no non-public or confidential documents were included in the analysis process.

4.5. Limitations

The research focused specifically on metropolitan municipalities and local governments pioneering in digitalization in Türkiye. Therefore, a comprehensive analysis of AI applications in small-scale municipalities was not included. Furthermore, because only document-based data collection was used, another limitation of the study was the lack of data sources such as field observation or interviews. However, this limitation was managed in a controlled manner within the framework of qualitative analysis appropriate to the purpose of the study.

5. Results

As a result of the document analysis conducted on metropolitan municipalities in Türkiye, national strategy documents, and publications of relevant public institutions, it was observed that the use of artificial intelligence in local governments is increasing and is clustered around specific themes. The findings are presented under four main themes: (1) Service Automation and Efficiency, (2) Transportation and Traffic Management, (3) Disaster and Risk Management, and (4) Participatory Management and Citizen Interaction.

5.1. Service Automation and Efficiency

Many municipalities are turning to AI-based automation systems in their core service areas. The Istanbul Metropolitan Municipality has made service planning more efficient with forecasting systems that analyze water and electricity consumption data. Furthermore, AI-powered chatbot systems quickly classify citizen requests and direct them to the relevant units (Tetikol, 2025). Meanwhile, the Ankara Metropolitan Municipality has achieved savings of up to 15% in fuel costs by optimizing routes in waste collection services using sensor data and algorithms (Toy, 2025).

These examples demonstrate the operational efficiency-enhancing effect of AI technologies. Furthermore, optimization of resource use is considered an important tool for municipalities to achieve their sustainability goals (Tuğaç, 2025).

5.2. Transportation and Traffic Management

According to findings, AI is most heavily used in smart transportation systems. Major cities such as Istanbul, Ankara, and Izmir implement algorithms that analyze traffic density data and manage signaling systems in real time. For example, the Istanbul Metropolitan Municipality Traffic Control Center can make instantaneous density predictions and offer alternative route suggestions with AI-powered systems (Tetikol, 2025). Similarly, the Izmir Metropolitan Municipality's public transportation unit, ESHOT, reorganized bus routes based on AI analysis, resulting in increased passenger satisfaction (Ege Son Havadis, 2024).

This finding demonstrates the potential of artificial intelligence to improve not only traffic management in urban transportation but also public transport efficiency and user experience. The literature also emphasizes that such applications provide environmental benefits by reducing carbon emissions (Kitchin, 2015).

5.3. Disaster and Risk Management

In countries with high earthquake risk, such as Türkiye, local governments must integrate artificial intelligence systems into their disaster management processes. As part of the "Earthquake Information System" project carried out in Istanbul, risk maps are created by analyzing data such as building inventory and soil structure, and this data guides urban transformation plans (T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 2021).

Additionally, Konya Metropolitan Municipality utilizes AI algorithms and satellite imagery to predict natural disasters such as drought risk and frost danger in agricultural areas (Karaçor & Topçu, 2025). Supporting pre-disaster early warning and preparedness processes with AI increases the effectiveness of the response process and reduces loss of life (Andrae & Tariq, 2025).

5.4. Participatory Management and Citizen Interaction

Local governments are also seen using artificial intelligence to increase citizen participation in digitalization processes. For example, big data collected through the "Suspended Request" platform developed in Istanbul is used to classify citizen requests, thus creating a prioritized agenda for administrators. AI algorithms can analyze public satisfaction from social media posts and measure citizen participation in local policies (Misuraca & van Noordt, 2020). Such practices highlight the importance of data-based decision-making in governance processes and support the strengthening of democratic participation through digital tools. However, it should be emphasized that ethical risks such as algorithmic bias and data privacy must also be carefully addressed (Floridi & Cowls, 2019).

5.5. Evaluation

The findings indicate that metropolitan municipalities in Türkiye are actively using AI technologies, particularly in operational services and city management. However, there is no standard approach or nationally coordinated strategy across these applications. This could lead to digital divides between municipalities.

Furthermore, while AI applications are widespread and diverse in municipalities with strong technological infrastructure, use is limited in medium- and small-sized municipalities. This difference is attributed to factors such as human resources, financial budget, and information technology capacity. The National Artificial Intelligence Strategy (2021–2025) includes capacity increase targets to reduce this gap (T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 2021).

Overall, artificial intelligence technologies stand out as a significant lever in the transformation of local governments. However, this transformation must be addressed not only from a technological perspective but also from a governance, ethical, and social perspective. Data security, algorithmic fairness, and the protection of citizens' digital rights are critical to the sustainability of this process.

6. Discussion

The findings of this research reveal that local governments in Türkiye, particularly in metropolitan cities, are increasingly using artificial intelligence technologies more widely and effectively in the areas of operational efficiency, transportation management, disaster risk reduction, and citizen participation. These results are consistent in many ways with international studies in the literature.

For example, a comprehensive study by Sun and Medaglia (2019) emphasized that AI applications in the public sector provide significant benefits, particularly in accelerating service delivery and optimizing resource utilization. Similarly, municipalities in Türkiye have been observed taking steps to optimize waste collection, energy management, and citizen demands with AI-powered systems. This demonstrates that local governments are increasing their capacity to utilize technology in the digital transformation process.

Findings regarding AI applications in transportation and traffic management align with Kitchin's (2015) study on the smart city concept. Kitchin (2015) stated that AI is an important tool for sustainable urban

living by improving urban mobility. The use of AI algorithms in traffic control and public transportation optimization by metropolitan municipalities such as Istanbul and Izmir in Türkiye indicates that the theoretical benefits of this technology are being realized in practice.

In the context of disaster and risk management, the data obtained in the study are similar to those in Andrae & Tariq's (2025) study on the effective role of artificial intelligence in disaster early warning systems. Given the high earthquake risk in Türkiye, local governments' development of AI-supported risk maps and forecasting systems offers an example of technology application tailored to regional needs. This demonstrates that local governments are strategically using technology not only for operational efficiency but also for citizen safety.

However, in the Turkish context, the fact that applications are predominantly limited to metropolitan municipalities confirms the digital divide problem in Türkiye, as identified by Tuğaç (2025). The limited use of AI technologies in small-scale municipalities is attributed to insufficient human and financial resources. This situation is also highlighted in the OECD (2024) report, which highlights the inequalities in the level of digitalization of public services in similar countries. Therefore, national strategies and support programs continue to be critical for expanding the use of AI in local governments in Türkiye.

Discussions regarding ethical and social dimensions align with the principles of AI put forward by Floridi and Cows (2019). Data obtained within the scope of the research indicates that local governments in Türkiye have not yet developed comprehensive policies on data security, algorithmic transparency, and citizens' digital rights in AI projects. This situation is considered a significant risk factor for the social acceptance and sustainability of AI applications.

While there have been positive developments in the use of artificial intelligence in local governments in Türkiye, strengthening the technical infrastructure, increasing human resource capacity, and developing ethical guidance mechanisms are necessary to ensure that these applications are sustainable and inclusive. Furthermore, adopting data management and citizen participation models that comply with international standards outlined in the literature will make the digital transformation of local governments more robust (Misuraca & van Noordt, 2020).

The municipalities in Table 1 utilize artificial intelligence technologies in various areas and at different scales. The Istanbul Metropolitan Municipality has developed decision support systems based on big data analytics, integrating machine learning and chatbot technologies, particularly in traffic management and citizen communication. These applications allow for reducing traffic congestion in a large and complex metropolis and for rapid response to citizen requests. However, the IMM faces various challenges related to its complex infrastructure and data security (Tetikol, 2025).

The Ankara Metropolitan Municipality (ABB) primarily uses AI technology to increase operational efficiency, developing sensor- and machine learning- based systems specifically for optimizing waste collection routes and detecting water leaks. While these applications have provided tangible economic benefits, such as fuel and water savings, improvements in technical infrastructure and human resources are still needed.

The Izmir Metropolitan Municipality aims to increase passenger satisfaction by optimizing public transportation routes using artificial intelligence. Using data mining techniques, routes have been planned more effectively, improving service quality. However, budget constraints remain a limiting factor in the technology's widespread adoption.

Konya Metropolitan Municipality primarily utilizes deep learning and satellite imaging technologies in agriculture and disaster management. Predicting natural disaster risks, such as drought and frost, contributes to the local economy and citizen safety. Data quality issues and regulatory compliance are challenges in this area.

In general, local governments in Türkiye are more intensive and comprehensive in their AI applications in metropolitan areas. Municipalities use different technologies depending on their application areas,

and success rates vary with intended use. However, common challenges such as infrastructure, human resources, financial resources, and data security limit the widespread adoption and effectiveness of AI applications. Therefore, coordinated strategies, technical support, and ethical guidance mechanisms need to be developed at the national level.

Table 1. Use of Artificial Intelligence Technology in Local Governments

Council	Application Area	AI Technology Used	Purpose of Application	Success / Results	Limitations / Challenges
Istanbul Metropolitan Municipality (IMM)	Traffic Management, Citizen Communication	Machine Learning, Chatbots	Optimizing traffic flow, responding quickly to citizen demands	Decrease in traffic congestion. increase in citizens satisfaction	Complex infrastructure, data security concerns
Ankara Metropolitan Municipality (ABB)	Waste Management, Water Leak Detection	Sensors, Machine Learning	Reducing costs and water losses by optimizing the route	Fuel savings of 15%. reduction in water losses	Technical infrastructure deficiencies, human resource needs
Izmir Metropolitan Municipality	Public Transport Optimization	Artificial Intelligence Analytics, Data Mining	Improving bus routes, increasing passenger satisfaction	Increased passenger satisfaction. more efficient routes	Budget constraints, limitations on widespread use
Konya Metropolitan Municipality	Agriculture and Disaster Management	Satellite Imagery, Deep Learning	Predicting drought and frost risks, improving disaster management	Increase in agricultural productivity. early warning system	Data quality issues, regulatory compliance requirements

7. Conclusion

This research examines the extent to which local governments in Türkiye are using artificial intelligence technologies and examples of their applications in this area, demonstrating the importance of AI in the digital transformation of public services. The findings demonstrate that AI is being effectively used in critical areas such as service automation, transportation management, disaster risk reduction, and citizen participation, particularly in metropolitan municipalities. This supports the view that AI technologies are an important tool for local governments in achieving their goals of improving service quality and using their resources more efficiently. However, the research also revealed significant differences in the size and capacity of local governments in Türkiye in their AI applications. While metropolitan municipalities are more advantageous in terms of technological infrastructure and human resources, AI use in small and medium-sized municipalities remains limited. This highlights the need for coordinated support programs and capacity-building activities at the national level. Additionally, it has been determined that the ethical, legal, and social dimensions of AI applications have not been adequately addressed. Issues such as data privacy, algorithmic transparency, and the protection of citizens' digital rights are emerging as critical areas that local governments should prioritize in AI projects. These issues are strategically important for the sustainable and acceptable dissemination of AI technologies. In conclusion, while the use of artificial intelligence technologies by local governments in Türkiye is increasing, the successful implementation of this transformation requires strengthening the technical infrastructure, increasing investments in human resources, and establishing ethical standards. Furthermore, developing national-level support and coordination mechanisms is essential to integrate small-scale municipalities into this process. This will enable a wider range of stakeholders to benefit from the opportunities offered by artificial intelligence in local governments, leading to lasting improvements in public services.

Statements and Declarations

Ethical Considerations

Not applicable.

Declaration of Conflicting Interests

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