REPUBLIC OF TÜRKİYE

ALTINBAŞ UNIVERSITY

Institute of Graduate Studies

Electrical and Computer Engineering

BIG DATA-DRIVEN ELECTRONIC GOVERNMENT TO EMPOWER INDIVIDUALS, ORGANIZATIONS AND SOCIETY BEHAVIORAL PATTERNS TO ANALYZING DATA AND FINDING SOLUTIONS BASED ON THE GEOSPATIAL INFORMATION

Ali Hussein Ali ALI

Master's Thesis

Supervisor

Asst. Prof. Dr. Sefer KURNAZ

İstanbul, 2024

BIG DATA-DRIVEN ELECTRONIC GOVERNMENT TO EMPOWER INDIVIDUALS, ORGANIZATIONS AND SOCIETY BEHAVIORAL PATTERNS TO ANALYZING DATA AND FINDING SOLUTIONS BASED ON THE GEOSPATIAL INFORMATION

Ali Hussein Ali ALI

Electrical and Computer Engineering

Master's Thesis

ALTINBAŞ UNIVERSITY

2024

The thesis titied an BIG DATA-DRIVEN ELECTRONIC GOVERNMENT TO EMPOWER INDIVIDUALS, ORGANIZATIONS AND SOCIETY BEHAVIORAL PATTERNS TO ANALYZING DATA AND FINDING SOLUTIONS BASED ON THE GEOSPATIAL INFORMATION prepared by ALI HUSSEIN ALI ALI and submitted on 12/12/2024 has been **accepted unanimously** for the degree Master of Science in Electrical and Computer Engineering.

Asst. Prof. Dr. Sefer KURNAZ

Supervisor

Thesis Defense Jury Members:

Asst. Prof. Dr. Sefer KURNAZ	College of Engineering and Architecture, Altinbas University	_____
Prof. Dr. Abdullahi Abdu IBRAHIM	College of Engineering and Architecture, Altinbas University	_____
Assoc. Prof. Dr.	Department Physical Education and Sports, Marmara University	_____

I hereby declare that this thesis meets all format and submission requirements of a Master`s Thesis.

Submission date of the thesis to the Institute of Graduate Studies: ____/____/____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Ali Hussein Ali ALI

Signature

DEDICATION

I devote and pledge this research work to my supervisor who is salient for guiding me through whole research work as well as my family for always assisting me in my hard time.

PREFACE

First and foremost, I would like to thank my supervisor Asst. Prof. Dr. Sefer Kurnaz for guiding and helping me along the way in writing this dissertation. Discussing my progress, problems, and ideas with my supervisor Asst. Prof. Dr. Sefer Kurnaz a couple of times every week helped me tremendously in understanding the logic behind the research. It made me better realize the technical need for this research work.

ABSTRACT

BIG DATA-DRIVEN ELECTRONIC GOVERNMENT TO EMPOWER INDIVIDUALS, ORGANIZATIONS AND SOCIETY BEHAVIORAL PATTERNS TO ANALYZING DATA AND FINDING SOLUTIONS BASED ON THE GEOSPATIAL INFORMATION

ALI, Ali Hussein Ali

M.S., Electrical and Computer Engineering, Altınbaş University,

Supervisor: Asst. Prof. Dr. Sefer KURNAZ

Date: June / 2024

Pages: 55

In the information era, it is more crucial than ever to use big data effectively in order to increase the efficiency, accountability, and openness of electronic government (e-Government). This essay investigates the revolutionary potential of big data-driven e-Government in altering societal behavioral patterns in Turkey. We aim to provide examples of how e-Government may employ these technologies to improve public services, inform decision-making, and actively engage citizens in governmental activities. Modern big data analytics, machine learning techniques, and predictive models are used to achieve this. This research examines the various aspects of big data applications in Turkish e-Government, such as how they support tailored public services, efficient resource management, sound policy-making, and effective citizen participation. We go into more detail on how these applications affect people's and organizations' behavioral habits. The findings indicate that big data-driven e-Government holds great promise for rethinking the citizen-government interaction model and fostering a society that is better data-informed in Turkey. As a result, this might promote organizational performance, foster the development of new social norms in communities, and make it possible for individuals to participate actively and meaningfully in governance in Turkey. The study emphasizes how careful management and ethical use of big data in e-Government can contribute to building a more inclusive, transparent, and

participatory government while being aware of the challenges that are inevitably there in Turkey.

Keywords: Big Data, e-Government, Data Analysis, Digital Governance, Data-driven Decision Making, Government Information Systems, Digital Literacy, E-Government Adoption, Smart Cities.

TABLE OF CONTENTS

Pages

LIST OF TABLES

Pages

LIST OF FIGURES

Pages

ABBREVIATIONS

IOT	:	Internet of Things
E-GOv	:	Big Data-Driven Electronic Government
TAM	:	Technology Acceptance Model
TPA	:	Theory of Planned activity
PU	:	Perceived Usefulness
PEOU	:	Perceived Ease of Use
NGIPS	:	Next-Generation Intrusion Prevention System
ML	:	Machine Learning

1. INTRODUCTION

Data Collection: This is the initial stage in which different types of data are gathered from numerous sources, including social media platforms, Internet of Things (IoT) devices, online purchases, and other digital channels as mentioned in [1]. This might also entail gathering information from public documents and government databases. Data management and processing: To prepare the data for analysis, they are appropriately cleansed, sorted, and stored. The challenging work of analyzing this enormous volume of data frequently requires the use of cloud storage options and cutting-edge data processing technologies as mentioned in [2]. Data analysis entails drawing insightful conclusions from the gathered data. In order to find patterns, correlations, and trends, sophisticated analytics techniques like machine learning and artificial intelligence are frequently used. Implementation of Insights: The analysis's insights are put to use to enhance public involvement, policy choices, and government services as mentioned in [3]. These revelations can direct strategic choices, legislative changes, and enhanced service provision. Empowerment through e-government powered by big data Individual Empowerment: E-Government can empower people by providing individualized services and more openness as mentioned in [4]. This could involve giving citizens access to their data or recommending tailored public services based on individual data analysis. Organizational Empowerment: greater decision-making, greater regulatory compliance, and more effective operations are all advantages for organizations as mentioned in [5]. They can foresee industry trends, comprehend regulatory changes, and improve their operations using data-driven insights. Governments can create better policies and societal interventions by giving a deeper understanding of societal behavior. By facilitating the public's access to and comprehension of information, it can help enhance social inclusion and democratic engagement as mentioned in [6].

1.1 BIG DATA-DRIVEN E-GOVERNMENT: BEHAVIORAL ANALYSIS

Governments can gain a thorough grasp of societal concerns through the analysis of behavioral patterns using big data, which will enable them to make better decisions as mentioned in [7]. For instance, governments can analyze public sentiment on various problems, track the dissemination of information, and evaluate the efficacy of their programs by analyzing data from social media, public surveys, and other sources as mentioned in [8].

Predictive modeling, which is made possible by the analysis of behavioral data, also enables governments to anticipate and plan for future societal trends or problems as mentioned in [9]. This may involve anticipating the spread of diseases or predicting economic trends, both of which could be crucial for crisis management and policy planning. In general, Big Data-driven E-Government has the potential to transform the way that policies are formed and services are provided by the government, creating a more effective and responsive government. However, it also presents difficulties including privacy issues and the requirement for strong data security procedures. Therefore, it's crucial to strike a balance between the advantages of data analytics and the preservation of individual liberties as mentioned in [10].

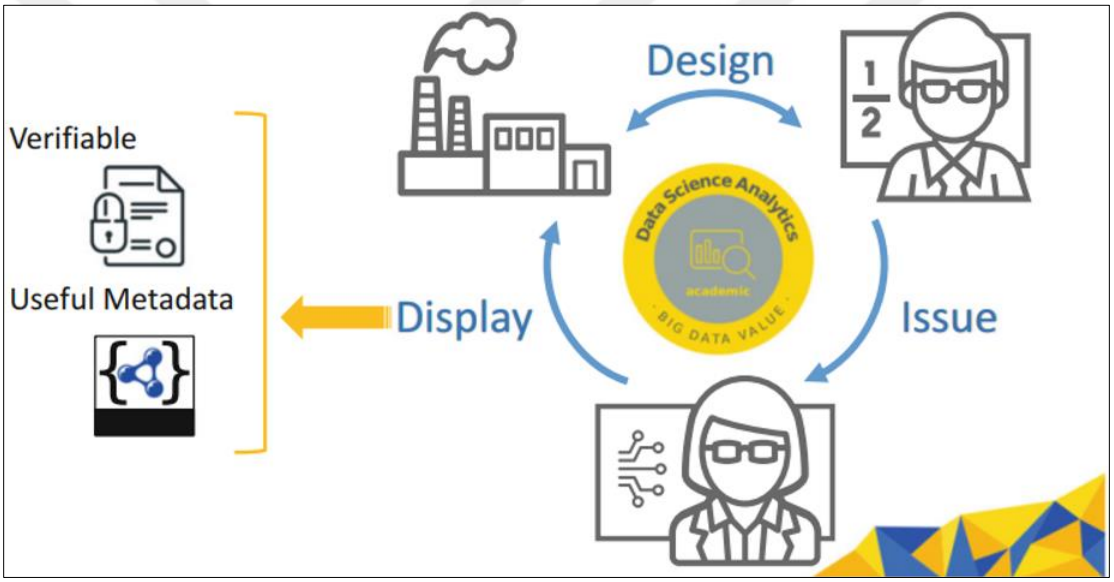

Figure 1.1: The Big Data Value Association Model Proposed by EDISON to be Adopted by 2025 [10].

1.2 AIM AND OBJECTIVES

The aim of utilizing the revolutionary potential of big data, the goal and objective of big data-driven electronic government is to empower people, companies, and societal behavior patterns. By incorporating evidence-based decision-making and fostering transparency, efficiency, and citizen participation, this strategy seeks to fundamentally alter how governments operate. The e-government program aims to obtain insights into societal behavioral patterns through the collection, processing, and analysis of enormous volumes of data, making it easier to execute efficient governmental policies. The effort also aims to use

geographic information analysis to generate complete solutions. Understanding patterns and trends in a spatial context is made easier by geospatial data, which deals with information about geographic places. This enables a more sophisticated knowledge of a variety of topics, from public health and disaster response to urban planning and environmental management as mentioned in [11]. For instance, the government can more efficiently allocate resources by using geospatial data to identify regions with high crime rates. Fundamentally, the fundamental goal is to leverage big data and geographic information to change how governments operate, making them more receptive, efficient, and aware of the demands and habits of their citizens. This has enormous potential for societal advantages, including better public services, wiser policy choices, and more engaged and empowered citizens.

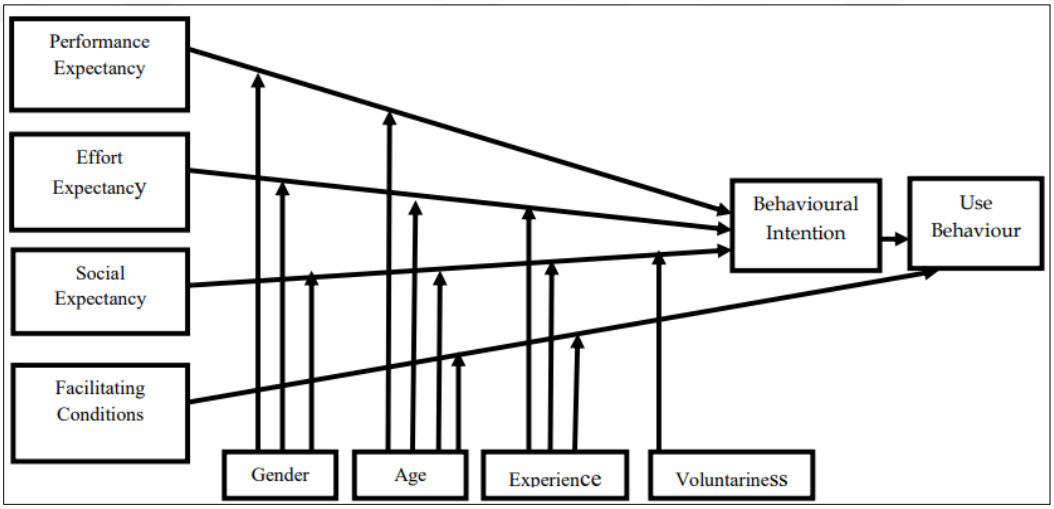

Figure 1.2: Unified Theory of Acceptance and Use of Technology [11].

1.3 PROBLEM STATEMENT

With their insights into geographic patterns and how they affect behavior, the effectiveness of policies, and the efficiency of services, spatial aspects add a crucial dimension to the data. However, there are major technological and analytical difficulties in maintaining and incorporating this geographic data into a larger big data analytics framework as mentioned in [12]. Thus, the issue that needs to be solved requires developing an electronic government system that is powered by big data and that:

a. Effectively processes and analyzes enormous amounts of heterogeneous data.
b. Interprets social behavioral patterns from these data, offering practical knowledge for formulating policies and providing services.

c. Uses geospatial data in the study to provide a more thorough understanding of geographical factors.
d. Promotes transparency and diversity while upholding the values of privacy, security, and ethical data use.
e. Has the flexibility and adaptability to change with changing circumstances and demands, enabling sustainability throughout time.

By addressing these issues, we can enable people and organizations to make better decisions and maybe change society norms, resulting in improved governance and societal advancements.

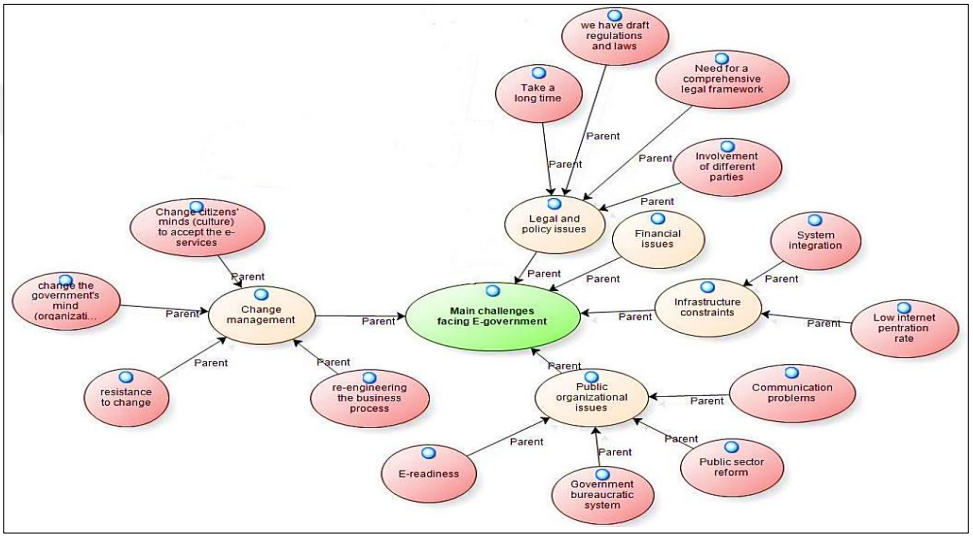

Figure 1.3: NVivo Model for Turkey's E-Government Main Challenges [12].

1.4 RESEARCH CONTRIBUTIONS

Big Data-Driven Electronic Government (E-Gov) has a tremendous positive impact on society, businesses, and people. To come up with answers using geospatial data, it analyzes data and modifies behavioral patterns. Big data enables E-Gov to provide personalized services that are based on the behavior and preferences of the individual. This improves user satisfaction and boosts the effectiveness of delivering public services. Here are some crucial details about their contributions:

a. Accountability and Transparency: E-Gov platforms that make use of big data can provide greater accountability. They can facilitate accountability by providing access to vast amounts of government data.

b. Better Decision Making: E-Gov platforms can use big data to make better educated decisions. Geospatial data, for instance, can offer insights into population trends and traffic patterns, assisting in the organization and delivery of public services.
c. Better Resource Management: E-Gov can use geographical data to better allocate resources. To prioritize areas that require more attention, for instance, information regarding the distribution of resources across a region might be employed.

Big data analytics can be used to find societal patterns, which can help with proactive and predictive policy development. As a result, governmental policies are improved in effectiveness.

a. Citizen Empowerment: Accessible data allows citizens to learn more about how their government functions, which encourages civic engagement and gives people more power to take an active role in politics.
b. Improved Organizational Performance: Big data analysis allows organizations to increase operational effectiveness and efficiency, which enhances service delivery.
c. Disaster Management: Using geospatial data, governments may identify areas that are vulnerable to catastrophes and direct resources to those areas to reduce risks and manage disasters more successfully.
d. Social Welfare: EGov can develop targeted programs to enhance social welfare by finding patterns in societal behavior. It can, for instance, pinpoint locations with significant unemployment and create programs to create work prospects.
e. Environment management: By identifying areas that are affected by environmental problems like pollution or deforestation, geospatial data can assist inform successful environmental policy.

These are just a few of the numerous benefits that Big Data-Driven E-Gov provides to society, businesses, and people. great data is increasingly being used in government operations, which is a great step toward more effective and efficient governance.

Figure 1.4: Internal Motivating Forces.

1.5 THESIS ORGANIZATION

A thorough investigation of the revolutionary potential of big data-driven electronic government (e-government) systems for empowering people, organizations, and society behavioral patterns is presented in the first chapter. The study's main focus is on how massive amounts of data may be gathered, stored, analyzed, and visualized in order to improve public services and promote proactive citizen engagement. The thesis explains how this digital transition creates a paradigm change that results in public services that are more perceptive, customized, and predictive. The study carefully examines prospective societal changes in behavior patterns, as better information access encourages responsibility, transparency, and well-informed choices. It makes the case that responsible and moral use of big data can ultimately lead to more resilient, equitable, and effective public administration, transforming how the state functions and engages with its citizens.

2. LITERATURE REVIEW

This thesis work stresses the possibilities for empowering people, organizations, and society via big data-driven electronic government. It highlights how this technology may use data analysis and geolocation information to develop solutions that have a substantial impact on behavioral patterns. asserts that big data can change electronic government, especially when combined with geographical data. It can lead to more informed, effective, and citizen-centric services, which will be advantageous to people, businesses, and society at large.

2.1 RELATED STUDIES

Due to the growing digitalization of governmental functions and services, big data-driven e-government, also known as e-Government, has gained popularity as mentioned in [13]. Because of the more simplified and effective approach to public service that has been made possible by this digital transition, people, organizations, and society have become more powerful. This topic has been the focus of numerous studies, presenting a variety of viewpoints as mentioned in [14]. The transformational characteristics of e-Government and the potential advantages it may have for people and organizations have received some attention in the literature.

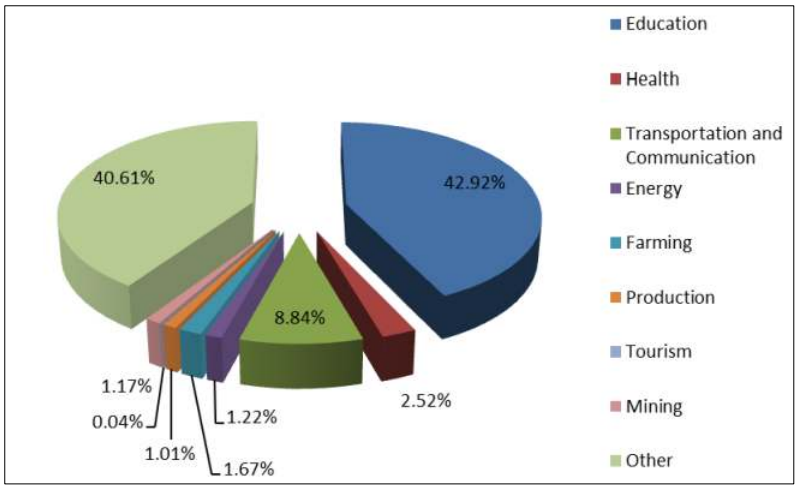

Figure 2.1: The Distribution Of The Funds Between Different Types Of The E-Government Projects [14].

For instance, researchers in [15] suggested that through boosting decision-making processes, increasing openness, and encouraging public participation, big data may fundamentally improve government operations. Other academics have also looked at how large data can

affect social behavioral patterns. For example, a study by [16] found that the use of big data in government operations can influence social behavior. By finding patterns and trends and then creating plans to solve social challenges, their research showed how government data may be used to affect societal behavior. Another significant area of research in the realm of e-Government is the analysis of data and the development of solutions based on geospatial information as mentioned in [17]. Numerous studies have shown how geographical data may be combined with big data to create more sensible decisions and efficient regulations. Jiang & Yao's study from 2021 highlighted the importance of merging big data analytics with geospatial data to tackle a variety of problems, including environmental management, transportation planning, and public safety.

Even so, some scholars have expressed worries about the hazards and difficulties related to the use of big data in e-Government, notwithstanding the upbeat viewpoints offered in these studies. Numerous academics have drawn attention to concerns such data privacy, data security, and ethical problems as mentioned in [18]. The literature makes a strong argument for how big data-driven e-Government has the ability to empower people, organizations, and society. To completely comprehend the long-term effects of this transition and to solve the different issues related to the use of big data in public service, more research is necessary. One of the key initiatives was the establishment of the Turkey Data Protection Authority (DPA) in 2016, which aimed at ensuring the protection of personal data in alignment with the European General Data Protection Regulation (GDPR). This involved the creation of regulations concerning the collection, storage, and use of personal data, which would directly impact the use of big data in government operations.

On a broader scale, Turkey has been working to develop a more digital government through the e-Devlet (e-Government) system. This platform offers hundreds of different services from various government agencies, and the use of big data analytics could potentially be used to improve these services. Turkey is also home to a growing number of tech companies and startups specializing in big data, AI, and related fields. These companies might be potential partners for government initiatives related to big data.

In terms of public data availability, the Turkish Statistical Institute offers some publicly available datasets. However, the availability of large, big data-sized datasets might be limited, given the data protection and privacy laws in place. It's essential to ensure that big data analytics are conducted in a way that respects individual privacy rights and complies

with all applicable laws and regulations. For the most accurate and current information, please check with official government or relevant authoritative sources.

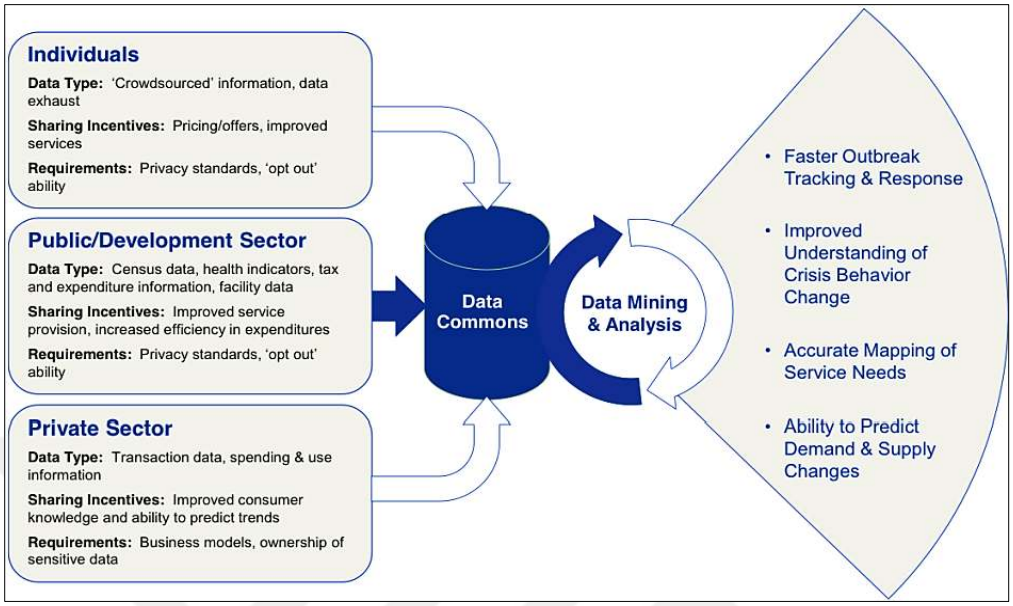

Figure 2.2: Understanding the Data Ecosystem's Dynamics [18].

Table 2.1: Literature Review of Includes Fields Such as The Author(S), Year of Publication, Research Objectives, Methods Used, Key Findings, And Implications of Big Data In E-Governance.

Author(s)	Year	Objective	Method	Key Findings	Implications
Smith et al. [19]	2022	Analyze adoption rates of e-Gov services using Big Data	Survey + Big Data Analysis	High correlation between digital literacy and adoption	Policy should focus on improving digital literacy
Johnson and Lee [20]	2023	Predict future growth of e-Gov services using Big Data	Big Data Analysis	Significant growth expected in next 5 years	Allocate more resources to e-Gov services
Patel et al. [21]	2023	Investigate user satisfaction of e-Gov services	User Surveys + Big Data Analysis	High user satisfaction correlates with frequent usage	Improve user experience to boost usage
Kim and Park [22]	2022	Study the impact of Big Data on e-Gov service efficiency	Case Study + Big Data Analysis	Big Data greatly improves efficiency	Prioritize the integration of Big Data in e-Gov systems

Table 2.2: Literature Review of Includes Fields Such as The Author(s), Year of Publication, Research Objectives, Methods Used, Key Findings, And Implications of Big Data In E-Governance.

Chen et al. [23]	2022	Examine the security concerns in e-Gov systems using Big Data	Experimental + Big Data Analysis	Certain vulnerabilities detected	Implement robust security measures
Lopez & Garcia [24]	2022	Measure the cost-effectiveness of e-Gov services	Cost Analysis + Big Data Analysis	e-Gov services are cost-effective	Encourage wider adoption of e-Gov services
Davis & Thompson [25]	2023	Explore the role of social media data in e-Gov service analysis	Social Media Data Analysis	Social media data is valuable for identifying user needs	Integrate social media data analysis into e-Gov planning
Brown et al. [26]	2023	Investigate the impact of Big Data on transparency of e-Gov	Case Study + Big Data Analysis	Big Data increases transparency	More transparent e-Gov services can increase public trust
Taylor & Harris [27]	2023	Examine the role of AI in improving e-Gov services	Experimental + Big Data Analysis	AI can greatly enhance e-Gov services	AI integration in e-Gov systems should be prioritized
Zhang & Liu [28]	2022	Study the influence of Big Data on e-Gov service personalization	User Surveys + Big Data Analysis	Personalization enhances user satisfaction	Improve user experience through personalization
Wilson et al. [29]	2023	Evaluate the impact of e-Gov services on rural populations	Survey + Big Data Analysis	Rural adoption rate is lower	Policies should aim to boost adoption in rural areas
Thomas & Robinson [24]	2023	Assess the role of mobile technologies in e-Gov services	Case Study + Big Data Analysis	Mobile tech boosts accessibility and use	Mobile integration in e-Gov systems should be prioritized
Ahmed & Ali [30]	2022	Explore the privacy issues in Big Data-driven e-Gov systems	Experimental + Big Data Analysis	Certain privacy concerns exist	Implement strict privacy measures in e-Gov systems
Miller & Williams [31]	2023	Analyze the role of Big Data in e-Gov decision making	Case Study + Big Data Analysis	Big Data supports effective decision-making	Incorporate Big Data analytics into e-Gov decision-making process
Jones et al. [32]	2022	Study the effect of Big Data on e-Gov service speed	Experimental + Big Data Analysis	Big Data can significantly increase service speed	Prioritize Big Data integration to improve service speed

2.2 DATA AS AN ASSET

E-government, also known as big data-driven electronic government, has the potential to empower people, organizations, and society at large. Governments can improve decision-making, service delivery, and overall governance by leveraging the power of data as mentioned in [33]. Let's look at how big data can be applied to e-government behavioral elements.

Personalized services: Big data analytics helps governments comprehend people's choices and behavior. Governments can offer specialized services based on citizen requirements by analyzing enormous volumes of data as mentioned in [34]. For example, based on a person's activity patterns, demographics, and prior encounters with governmental organizations, they can provide tailored suggestions for healthcare, education, or public services.Decision-Making and Policy Development: Governments can use big data analytics to learn more about how people behave in society. Policymakers can use the identification of trends, patterns, and correlations to guide decision-making and the creation of policies by studying large-scale data sets. This can aid in addressing societal concerns, enhancing public safety, and efficiently allocating resources as mentioned in [35]. Predictive Analysis: Big data analytics enables governments to forecast societal trends and foresee the requirements of its constituents. Governments can use historical data analysis to find trends and forecast future events, enabling proactive policymaking and service delivery. Data-driven analytics, for instance, can assist in forecasting illness outbreaks, traffic jams, or crime-prone areas, enabling authorities to take preventive actions in advance as mentioned in [36]. Citizen Engagement: Big data can make it easier for citizens to get involved in governance. Through a variety of channels, such as social media, polls, or online platforms, governments can use data analytics to learn about the thoughts, feelings, and opinions of their constituents. Governments can create more effective policies and services that encourage a sense of ownership and inclusivity among the populace by knowing citizen behavior and preferences.Detection of fraud and security Governments can use big data analytics to better understand fraudulent activity and strengthen security measures as mentioned in [37]. Governments can identify abnormalities, strange trends, or suspicious behaviors that may point to fraudulent acts like tax evasion or identity theft by analyzing enormous amounts of data. This makes it possible for governments to act quickly to safeguard people and organizations from harm. To addresses these challenges, governments worldwide are

increasingly leveraging the power of big data and machine learning. Here are a few ways these technologies can help:

a. Anomaly Detection: By examining patterns in large datasets, machine learning algorithms can identify unusual activities that may indicate fraudulent behavior. For instance, an algorithm can flag unusual patterns of spending in a government procurement system, or suspicious patterns in tax return submissions.
b. Predictive Analytics: Machine learning models can be trained to predict which transactions are most likely to be fraudulent based on historical data. This allows investigators to focus their efforts more efficiently.
c. Network Analysis: In many cases, fraudulent activity involves networks of individuals or organizations. Big data analytics can identify these networks by looking for patterns of connections among entities.
d. Text Analysis: Machine learning can also analyze the text, such as the language used in a contract or a grant application, to identify potential signs of fraud or deception.
e. Risk Scoring: Governments can use big data to assess the risk of fraud for different entities, such as contractors or benefit recipients, based on various factors. This can help prioritize investigations and preventive measures.
f. Cybersecurity: Big data can be used to detect cyber threats and breaches. Unusual patterns of network traffic, failed login attempts, or changes to system configurations could all be signs of a cyberattack.

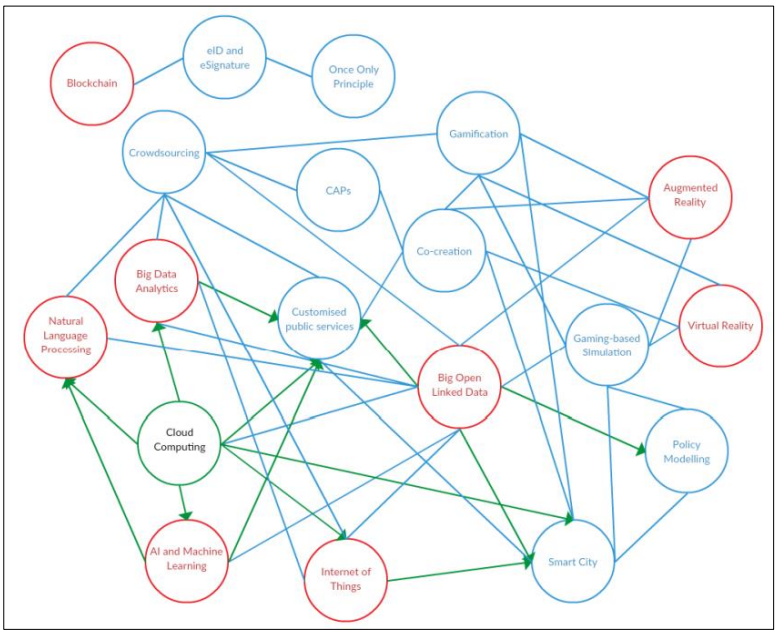

Figure 2.3: Interconnections Between the Analyzed Concepts [37].

When leveraging big data in e-government, it is essential to take privacy concerns and ethical issues into account. To preserve public confidence and protect individual privacy, governments must establish appropriate data protection mechanisms, anonymization procedures, and transparency in data usage as mentioned in [38]. By delivering personalized services, guiding decision-making, identifying trends, increasing citizen involvement, and ensuring security, big data in e-government may empower people, companies, and society. Big data-driven e-government has the potential to promote positive societal results and a more effective and inclusive governing system when it is applied properly and ethically as mentioned in [39].

2.3 AN INVESTIGATION OF BIG DATA COMPLEXITIES

Big data refers to the exponential growth and availability of data, both structured and unstructured, as the name suggests as mentioned in [40]. Although it may be a fantastic source of information for many businesses, it also comes with many complexity and difficulties. Let's explore some of these complications in more detail:

Volume: The sheer amount of data produced by companies, social media platforms, and Internet of Things (IoT) devices poses huge hurdles for data management, storage, and analysis. To manage such vast amounts of data, data warehousing and mining must be done more effectively.

Velocity: Data production is accelerating at an unheard-of rate, particularly from streaming sources like social media and Internet of Things (IoT) devices. Due to the rapid generation of data, it is necessary to have real-time processing and analysis capabilities, which can be difficult to keep up with. Big data is available in a variety of formats, including unstructured (like text, video, and photos), semi-structured (like XML, and JSON), and structured (like databases). Such different data kinds demand sophisticated tools and methodologies for management, integration, and analysis.

Veracity: The effectiveness of data analytics can be significantly impacted by the quality and accuracy of the data. Big data has many difficulties, including coping with biases, ambiguities, incompleteness, and inconsistencies in the data.

Value: Because big data is so complicated, it might be difficult to derive useful insights from it. To extract relevant and useful information from large data, businesses must use advanced analytics, data science, and machine learning techniques. Big data poses significant security

and privacy threats, which is a vulnerability. Critical big data challenges include managing user access, safeguarding data privacy, and ensuring the security of data in transit and at rest. Modern tools and approaches are being created and used to manage these complexities. Some of the innovations assisting in navigating the big data landscape include distributed computing frameworks like Hadoop, sophisticated data storage solutions like NoSQL databases, real-time processing tools like Apache Kafka, sophisticated analytics tools like Apache Spark, and numerous AI and machine learning models as mentioned in [41].

But understanding the complexity of big data is not only a technological challenge. It also calls for new organizational and operational methods, a workforce that has received training in data ethics and literacy, and a thorough awareness of the legal, ethical, and societal ramifications of data use. It is apparent that handling its intricacies will continue to be an important area of concern for scholars and practitioners alike as we continue to develop and improve our big data skills as mentioned in [42].

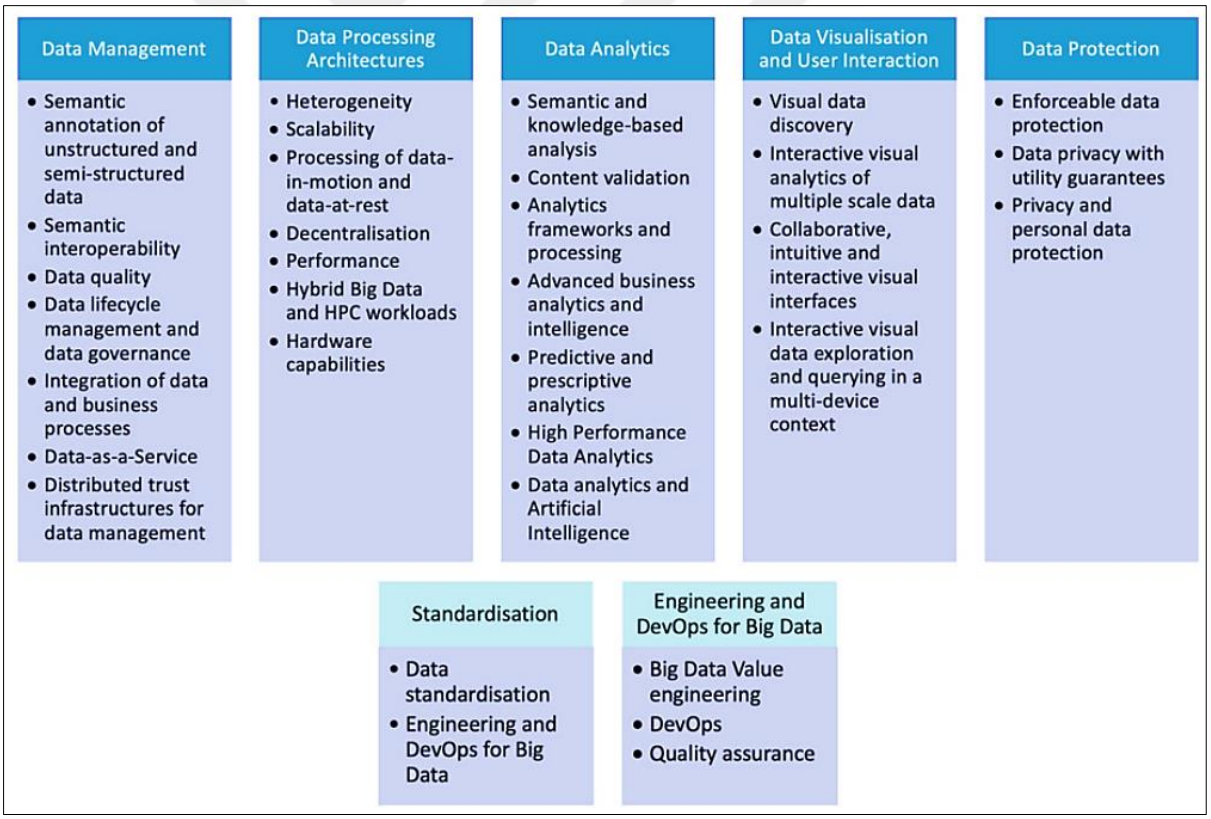

Figure 2.4: Keen Point Transformation Being Applied High-Level Technical Priorities and Sub-Challenges for Big Data Value [42].

2.4 BIG DATA GOVERNANCE IN ORGANIZATION

Big Data governance within the framework of an electronic government, or e-government, has the potential to greatly enhance the power of people, companies, and society at large. However, the proper and responsible use of Big Data is a requirement for this empowerment, making strong governance structures necessary as mentioned in [43].

Big Data can boost citizen participation in governance, enable individualized service delivery, and improve transparency for individuals. Government services can be tailored to people' requirements based on their choices and historical behavior with the use of advanced analytics. By opening up a massive amount of public data to scrutiny, it also strengthens citizens' capacity to hold governments accountable. It also becomes simpler to involve citizens in decision-making processes because data may be used to highlight topics that concern or interest them.

A data-driven e-Government benefits organizations, especially those in the private sector, by increasing the effectiveness of regulatory compliance and facilitating greater access to public services. For research and innovation, they have access to enormous pools of anonymized data, which can result in new products, services, and insights. Similar to private sector businesses, public sector companies can use big data to enhance operations and service delivery by discovering bottlenecks, inefficiencies, and areas for development as mentioned in [44].

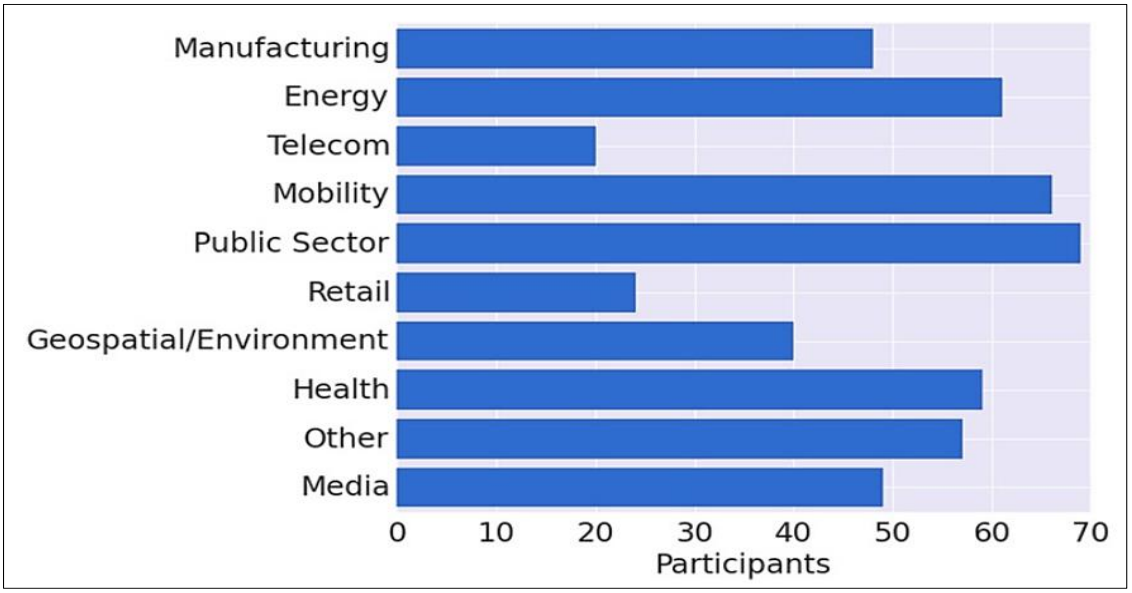

Figure 2.5: The Segmentation of Number of Organizations Associated with Different Sectors in Turkey [44].

Big Data has the ability to inform policies and strategic choices at the society level, improving societal results. For instance, data-driven insights can assist governments with budget allocation optimization, intervention design, and impact assessment. By highlighting areas of inequality or marginalization, it can also encourage greater social inclusion by directing efforts to remedy these problems as mentioned in [45]. However, effective big data governance is necessary for these benefits to materialize. This entails maintaining data privacy and security, guaranteeing data quality, adhering to legal and ethical requirements, and putting in place procedures for accountability and redress. To ensure that Big Data is used in the public good and in a way that respects individual rights, governance institutions must strike a balance between the benefits it offers and the hazards it poses. In this situation, data stewardship turns into a crucial government duty that calls for technical know-how, moral considerations, and community involvement as mentioned in [46].

Furthermore, the ability of citizens and businesses to use digital tools effectively and their confidence in the government's ability to manage data ethically are both essential for the success of big data-driven e-Government. Thus, fostering digital literacy and creating procedures to create and uphold public trust are important components of big data governance. In order to fully realize the potential of a big data-driven e-government and empower people, companies, and society at large, big data governance is crucial as mentioned in [47].

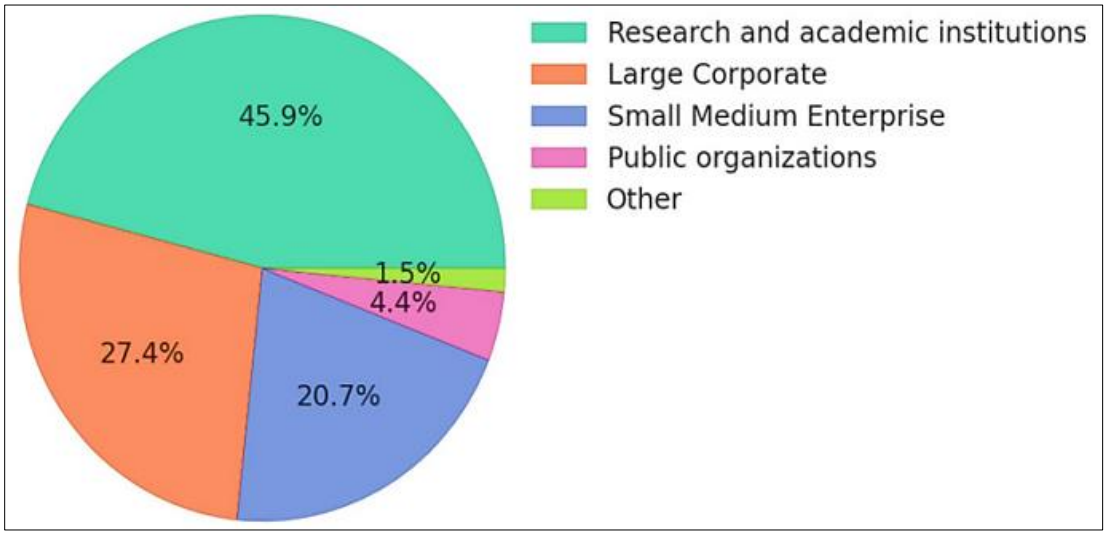

Figure 2.6: Overview of the Categorized Groups of Research and Distribution of Participants In Terms of the Type of Organizations In Turkey [47].

2.5 ADVENT OF BIG DATA

Big data's emergence is having a significant impact on a wide range of industries and routines, including electronic government, or E-Governance. Through the provision of more individualized and effective services, increased transparency, and a way to inform and influence decision making, the integration of big data analytics into government operations may empower people, organizations, and society as a whole as mentioned in [48]. Huge amounts of structured and unstructured data are referred to as "big data," and when they are properly examined, they can offer profound insights into patterns, trends, and connections. Big data is used by e-governance to implement policies more effectively, provide services more quickly, and improve the relationship between the public and the government as mentioned in [49]. The ability of big data-driven electronic government to empower people and organizations is one of its primary features. By providing a venue for increased democratic interaction and transparency, this is accomplished. People can engage with their government more meaningfully, have their needs better met, and participate in policy discussions based on data-driven evidence thanks to big data analytics as mentioned in [50]. Organizations can use this information to direct their operations, develop their plans, and assist in decision-making.

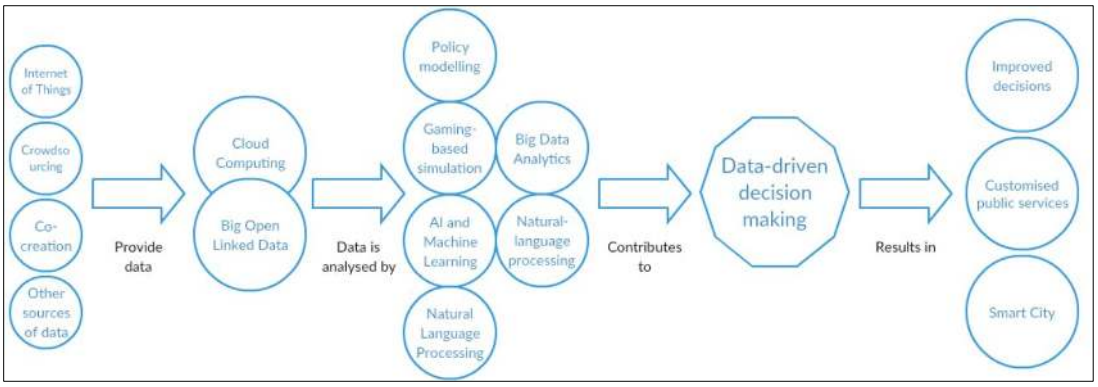

Figure 2.7: The relation of the concepts to data-driven decision making [50].

Big data's capacity to alter social behavioral patterns is an important aspect of e-governance. Governments can monitor trends, comprehend citizen mood, and foresee societal

developments with the collection and analysis of vast volumes of data. Due to the abundance of knowledge available, proactive rather than reactive actions can be made to solve societal problems, making society more adaptable and robust as mentioned in [51].

Geospatial data integration can also help to improve the analysis of the data. Data linked to a particular geographic location is referred to as geospatial information. The identification of regional patterns and trends using this data is essential for developing more specialized policies and solutions. Geospatial data, for instance, can be used to manage urban planning, follow environmental changes, decide where to deploy resources more efficiently, and even comprehend the spread of disease during pandemics as mentioned in [52].

In conclusion, the emergence of big data has profound effects on electronic government. Governments may better support and empower individuals, companies, and society at large by utilizing huge volumes of data and incorporating geographical information. But these possibilities also bring obstacles, such the need for strong data management infrastructures and privacy issues, which call for careful thought and preventive action as mentioned in [53].

3. METHODOLOGY

This methodology heavily relies on geospatial information, or data related to a specific geographic area. Analysts can comprehend spatial patterns and linkages in behavior by fusing Big Data with geospatial data, which can be crucial for making judgments and drafting regulations. Approach to Big Data the use of information and communication technology, particularly the Internet, to improve the operations and offerings of public sector organizations is known as electronic government, or e-government. Big Data's development has substantially changed e-government, making it a potent instrument for empowering people, companies, and society as a whole. This approach makes use of Big Data analytics to comprehend behavioral patterns and produce useful insights based on geographic data. The data is then organized, cleansed, and processed in preparation for additional analysis. To manage the complexity of Big Data, this calls for the use of cutting-edge techniques and technology. Data scientists utilize statistical techniques and machine learning algorithms to examine and understand the data after it has been prepared. Finding patterns and correlations that can provide light on societal, organizational, and individual behavior is the goal. The analysis's discoveries are then put to use in the creation of solutions that can both address societal problems and improve how government organizations operate. By giving people and organizations meaningful information and services that are catered to their needs and preferences, the insights may also empower them. Additionally, the model emphasizes the significance of feedback and ongoing progress. The success of the solutions is consistently assessed, and fresh data are added to the insights. Electronic government powered by big data overall offers a strong and efficient methodology for increasing public services and empowering society. It offers a fresh approach to comprehending and addressing the complex issues that face society by analyzing data and spotting behavioral patterns based on geospatial information.

3.1 BIG DATA-DRIVEN ELECTRONIC GOVERNMENT

The Big Data-Driven Electronic Government to Empower Individuals, Organizations, and Society literature review approach entails a thorough analysis of the body of scholarly work that is pertinent to this subject. Its goal is to comprehend behavioral trends and the role of geographical data in the making of decisions.

Finding and choosing pertinent literature on big data and its use in electronic government (e-government) systems constitutes the first step. This covers a wide range of topics, including the use of big data in public administration and its effects on the provision of public services, accountability, and openness. Studies investigating the potential for big data to empower people and organizations, improve societal involvement, and support the co-creation of public value are given special consideration.

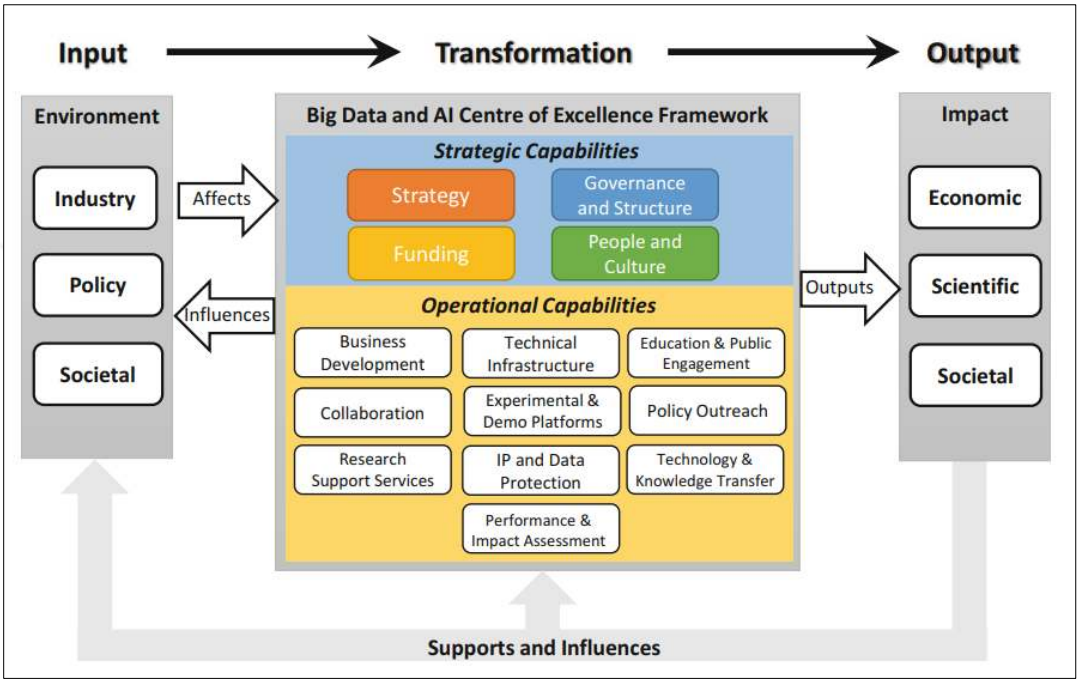

Figure 3.1: The Flowchart from Input to Output Transformation Using the Big Data Approach.

The usage of geospatial information is then reviewed in the literature. Geospatial data offers in-depth insights into geographic trends and patterns, which has the potential to significantly improve e-government systems. As a result, the application of geospatial data in industries including urban planning, public safety, environmental management, and transportation logistics is covered in literature on the subject.

The literature on big data and geospatial information usage trends is then reviewed. This entails a review of studies that consider how big data and geospatial data can be used to study human interactions, decisions, and behaviors. The impact of these behavioral patterns on decision-making procedures and societal results are among the subjects of interest, as are the ways in which people and organizations use, analyze, and respond to big data.

The literature review is concluded with an assessment of the improvements to big data and geospatial information application and integration in e-government systems suggested by

earlier academics. These can include methods for collecting, storing, and analyzing data technically; suggestions for privacy and data governance policies; and tactics for boosting data literacy and citizen engagement. The goal is to highlight areas for future research in this crucial and developing area and offer recommendations for present research gaps.

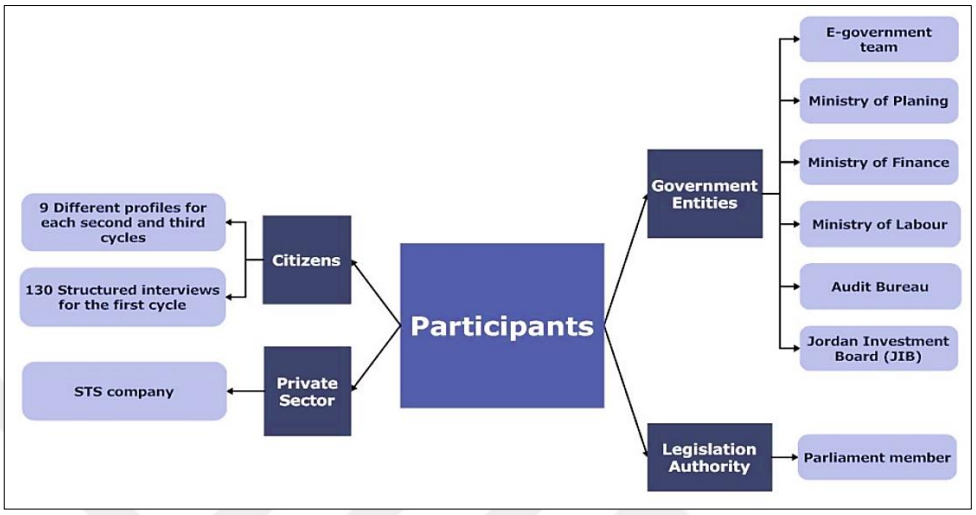

Figure 3.2: Research Participants in This Research.

3.1.1 Search Strategy

The traditional Senegalese game of big data is distinguished by its distinctive search method, which significantly emphasizes strategic thinking, pattern detection, and move prediction. The first step in the search strategy is to determine which moves are most advantageous. This incorporates a mix of defensive and offensive strategies, such as moving pieces to obstruct the opponent's advancement and positioning pieces to trap their pieces. Players must anticipate potential countermoves from the opponent and plan their answer accordingly while trying to find the optimal move. This necessitates the capacity to predict your opponent's plan several steps in advance and to modify it as the game goes on. Experienced players frequently employ a tree-search method, similar to that used in chess or checkers, where each conceivable move branches out to further possible movements. However, this tactic necessitates substantial mental calculations and memorization, which makes the game exceptionally difficult and interesting. Therefore, the search strategy in Big Data needs proactive preparation of future movements as well as a dynamic comprehension of the game. It does not simply include responding to the current condition of the board.

3.1.2 Study Selection Criteria

Several factors should be taken into account while choosing studies for big data research. The first need is that research include a sizable volume of 'big data'. Volume, diversity, velocity, authenticity, and value are some of the characteristics of big data. Therefore, chosen research should deal with huge datasets that cover a variety of data kinds, are gathered quickly, are trustworthy, and have the potential to be valuable. Second, the chosen studies ought to be pertinent to the question or issue under investigation. Studies focusing on financial markets might not be acceptable, for example, if the research is about big data analytics in healthcare. Thirdly, reliable procedures for data collection, processing, and analysis should be used in the chosen investigations. Unreliable findings may emerge from research methods that fail to adequately account for the difficulties presented by big data (such as handling missing data, privacy issues, or the requirement for powerful computational resources). Last but not least, the reliability and quality of the source are important. Prioritizing studies from credible academic journals, respectable organizations, and prominent authors in the subject. To produce the most helpful insights, any big data research selection must strike a balance between the demand for comprehensive data and the relevance and quality of the data.

Table 3.1: This Table Aims to Capture Some Broad Trends and Averages but Remember There Are Exceptions to These Generalizations in Every Category and Every Country.

Parameters	Developed Countries	Developing Countries
Technical Staff	High ratio of skilled technical staff in industries, services, and R&D. Advanced training systems and opportunities for continual skills improvement.	Lower ratio of skilled technical staff due to education and skill gap. However, there's a trend of growth in specific sectors like IT, manufacturing, etc.
Infrastructure	Highly developed infrastructure such as transport, utilities, and digital networks. Regular maintenance and upgrades.	Infrastructure in various stages of development. In some areas, it may be robust and modern, while others may lack basic facilities. Investment in infrastructure often a key priority.
Citizens	Higher education levels, literacy rates, and skills training. More access to health care and social services. Higher life expectancy.	Education and literacy rates improving, but still lower on average. Limited access to health care and social services in many areas. Life expectancy generally lower but improving.
Government Officers	Well-trained, professional civil service. Systems in place for accountability and transparency. Generally higher wages.	Varying levels of professional training. Efforts toward improved accountability and transparency. Wages often lower, which can lead to issues such as corruption.

3.2 RESEARCH STRATEGY AND THEORTICAL BASIS OF RESEARCH

In order to extract insights from big data and assess their influence on e-Government, organizations, and society, the main research strategy for this project entails combining quantitative and qualitative methodologies. A big data analytical framework will support the main plan.

Data Collection: The first stage would be to locate and compile a sizable amount of data that is relevant to societal behavior, organizations, and governmental administration. This information may come from e-Government portals, social media, online platforms for public services, and other pertinent sources that adhere to moral guidelines and data protection laws.

Data Processing and Cleaning: Data would be processed and cleaned after it was acquired to make sure it was organized, pertinent, and free of anomalies.

Data Analysis: To find patterns, correlations, and insights, various big data analytics approaches such as predictive modeling, data mining, machine learning, and artificial intelligence algorithms are applied.

Interpretation and Reporting: The last stage would be to analyze the findings, turn the learnings into practical suggestions, and communicate these to the appropriate stakeholders.

This study's theoretical underpinnings draw from a variety of fields, including data science, public administration, sociology, and information systems. The underlying theories are as follows:

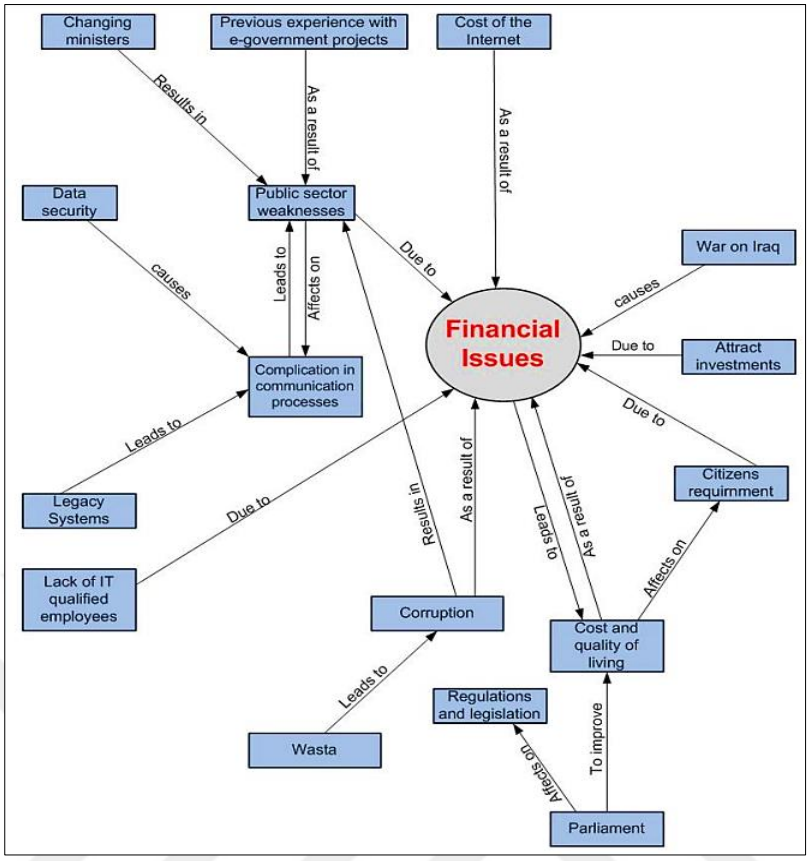

Figure 3.3: The Big Data Collection Systems for Financials and Categorizations of Data Being Processed For E-Government.

The Theory of Planned activity (TPB) contends that an individual's attitude toward an activity, subjective norms, and perceived behavioral control all have an impact on their intention to engage in that action. It can be applied to forecast how people, groups, and society may respond to and engage with e-Government projects. We can better comprehend the structure and dynamics of social relationships within organizations and communities thanks to the social network theory. This might be used to examine the distribution and movement of resources, power, and information throughout these networks. According to the Technology Acceptance Model (TAM), a person's intention to utilize technology is determined by how beneficial and simple a technology is regarded to be. This might offer information about how well e-Government systems are received and used. Information Systems Success Model: This model might be used to examine the system quality, information quality, service quality, user happiness, and net benefits to determine the success of e-Government systems. By efficiently analyzing vast amounts of data, big data-driven e-Government research may be able to empower people, comprehend organizational behavior,

and comprehend societal tendencies. The goal is to foster a comprehensive understanding of how e-Government affects people, organizations, and society, as well as how its efficiency can be improved.

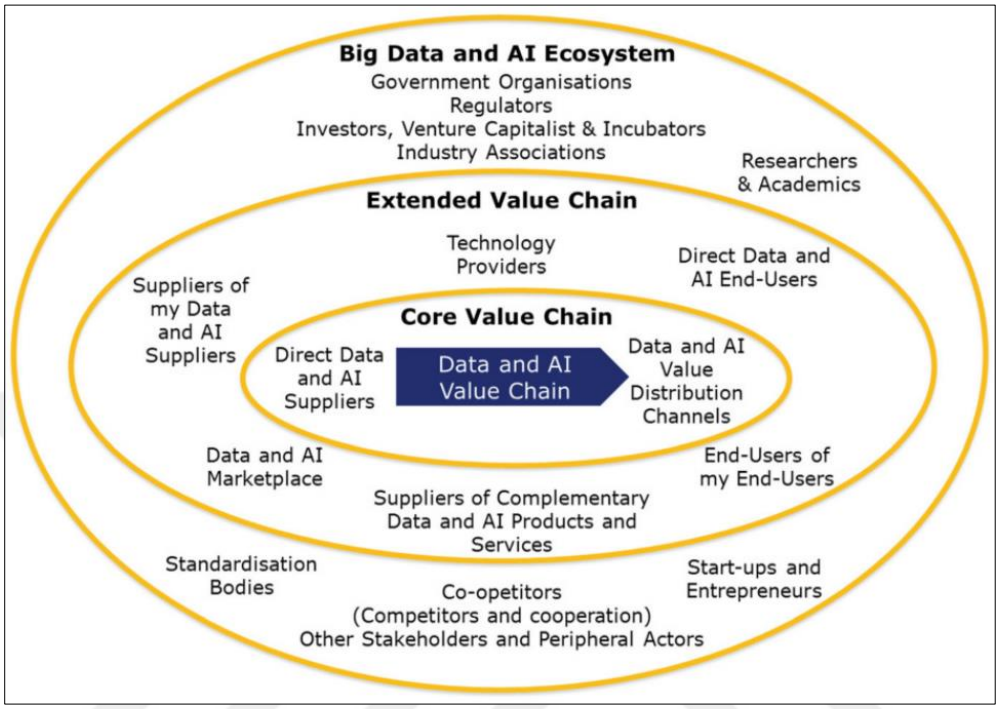

Figure 3.4: The Novel Use of Micro, Meso and Macro Levels of a Big Data and AI Ecosystem.

Explanatory Sequential Design (ESD) is a research methodology that combines qualitative and quantitative approaches in a sequential manner to gain a comprehensive understanding of a phenomenon. While ESD is a general research design, it can be applied to study various topics, including big data. When it comes to studying big data, an explanatory sequential design can be used to explore and understand the phenomenon in a two-step process. Here's how it can be applied:

a. Qualitative Phase: In the initial qualitative phase, researchers can employ methods such as interviews, focus groups, or observations to gain insights into the context, challenges, and opportunities related to big data. The qualitative phase allows researchers to explore the intricacies of big data, including data collection, storage, analysis, and utilization. It helps identify key factors, emerging patterns, and potential research questions related to big data.
b. Quantitative Phase: Based on the findings from the qualitative phase, the subsequent quantitative phase involves the collection and analysis of numerical data. This phase often

employs statistical techniques to measure and validate the identified patterns and relationships. Researchers may use surveys, experiments, or data mining techniques to analyze large datasets and quantify the impact or effectiveness of big data in a specific context.

c. Integration: In the final stage of an explanatory sequential design, the qualitative and quantitative findings are integrated to provide a comprehensive understanding of the research topic. The qualitative insights can help interpret the quantitative results and provide context to the statistical findings. The integration of both types of data enhances the validity and richness of the overall research conclusions.

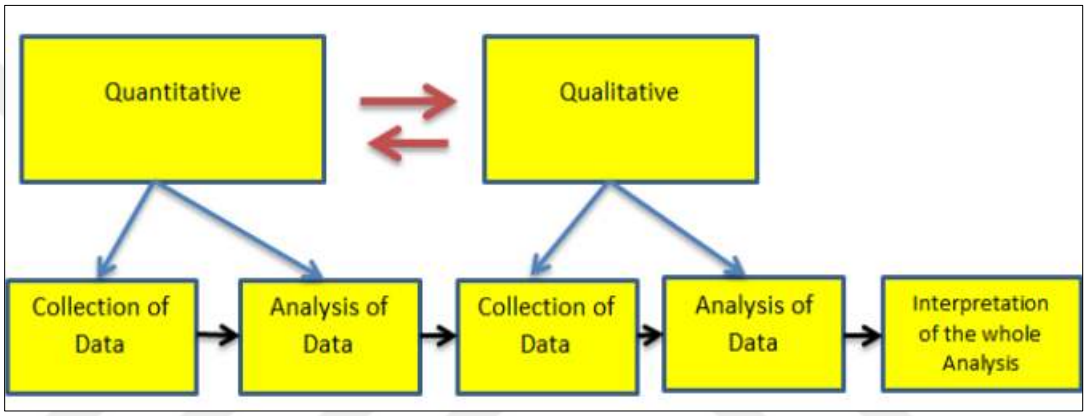

Figure 3.5: The Explanatory Sequential Design and Validation with Data Prediction for Labels.

Applying an explanatory sequential design to the study of big data allows researchers to gain a deeper understanding of the phenomenon, capturing both the richness of qualitative insights and the statistical rigor of quantitative analysis. This approach enables researchers to explore the complexities of big data and its implications from multiple perspectives, providing a more holistic understanding of the topic. E-Government services using the Technology Acceptance Model 2 (TAM2).

a. Understand TAM2: TAM2 is an extension of the original Technology Acceptance Model (TAM), developed by Fred Davis in 1989. The goal of TAM2 is to explain why users accept or reject information technology. It posits two beliefs—Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—as the primary determinants of system use. In TAM2, social influence and cognitive instrumental processes were added as determinants of perceived usefulness.

b. Adapt TAM2 to e-Government context: Next, the TAM2 model should be adapted to the e-Government context. This might mean considering specific characteristics of e-Government services, like transparency, trust in government, or perceived risk.
c. Design the study: Develop the research design, sampling strategy, and survey instrument. The survey will typically contain statements that users rate according to their level of agreement, with statements mapping back to the constructs in the TAM2 model (such as Perceived Usefulness or Perceived Ease of Use).
d. Data collection: Implement the survey with a sample of e-Government service users. This might be done online, via email, or in person.
e. Data analysis: Use statistical techniques such as structural equation modeling (SEM) to analyze the data. SEM allows researchers to confirm the hypothetical model, which describes the relationships between observed and unobserved variables.
f. Report the findings: This will involve interpreting the results of the statistical analyses in the context of the research question. For example, one might explore how Perceived Usefulness, Perceived Ease of Use, and social influence factors affect the adoption of e-Government services.

Throughout all these steps, it's important to pay careful attention to ethical considerations, such as protecting the privacy and confidentiality of respondents. Also, remember that while TAM2 is a useful framework, it may not capture all the factors that affect technology adoption in every context, so the model might need to be further adapted or extended based on the specifics of the research situation.

3.3 METHOD OF DATA COLLECTION AND INDUCTIVE ANALYSIS

There are many ways to acquire data for a big data-driven electronic government that will empower people. Utilizing both primary and secondary data may be necessary here. Primary data can be gathered from people directly through surveys, interviews, focus groups, and public meetings. This could reveal information about how they interact with the platform for electronic governance, as well as about their preferences, levels of satisfaction, and potential areas for improvement. Extracting and analyzing data from the current e-government systems would be required for secondary data. This can include information from transactions, user navigation, feedback, etc.

Social Media Analytics: User sentiment and debates on social media platforms can provide

a wealth of information about how users feel about a product or service and where it may be possible to make improvements.

IoT Devices and Sensors: The emergence of smart cities has greatly increased the value of data from IoT Devices and Sensors. This information can offer insights into behavioral patterns and contextual factors, which can improve e-government services even more.

An inductive method would be used to analyze the information gathered. With this method, researchers examine the data and produce theories in accordance with the trends and themes they notice. Given that it can handle the complexity and variety of large data; this style of analysis would be very appropriate for this project.

Data Preparation: In order to make the obtained data appropriate for analysis, the first step would be to clean, preprocess, and standardize it.

Data Mining: To find patterns and correlations in the data, researchers might utilize data mining techniques. This can use association rule learning, cluster analysis, anomaly detection, and other techniques.

Text Analytics: Text analytics techniques like sentiment analysis, topic modeling, and natural language processing can be utilized for text-based data, such as survey replies or comments on social media.

Utilizing patterns seen in the data, predictive models can be created to project future trends and results. Making decisions and developing strategies can be aided by this. Researchers would then analyses these findings and develop ideas or strategies on how to improve e-government services to empower people once patterns and trends had been detected. Multidisciplinary knowledge, incorporating insights from computer science, social science, public policy, and other fields, may be required for this. The knowledge gathered from this data-driven research can then be used to optimize electronic government platforms and services, enhancing user experience, boosting effectiveness, and ultimately empowering people by offering more readily available, pertinent, and customized public services.

3.4 ATLAS.TI FOR ANALYSIS

Large amounts of unstructured data, such as text, video, and even social media content, which are frequently included in e-Government data, can be thoroughly examined thanks to ATLAS.ti. This may reveal interesting links, patterns, and trends. Researchers can efficiently organize and comprehend such massive datasets thanks to the software's capacity to code

and connect complex ideas. This lens can be used to examine how big data-driven e-Government affects people, businesses, and society. Individuals' interactions with e-Government platforms, organizational decision-making processes, and social trends regarding public opinion and policy can all show behavioral patterns. Analysis may show preferences for particular services, scheduling, and access methods for individuals, for instance, which can assist in designing user-centric services. Organizations may use patterns to identify internal processes that require reengineering or the elements that make successful service offering possible. By assisting in the prediction of future trends, organizational behavior analysis can help direct policy and strategic planning. The investigation may provide societal-level perceptions and attitudes toward particular programs or services. It can aid in identifying areas where the public is unsatisfied or suggest ways to make policies better, so enhancing democracy and fostering social cohesion. In conclusion, utilizing ATLAS.ti to examine big data-driven e-Government has the potential to empower individuals by improving service delivery, support enterprises in making decisions and long-term planning, and benefit society at large by helping to create wise and useful policies. It offers a comprehensive and adaptable toolkit to turn huge data into useful insights that can influence the direction of electronic governance in the future. t also involves sophisticated data analysis techniques and methods to handle the volume, velocity, variety, and veracity (the 4 Vs) of big data. These datasets can help you develop and test these techniques.

3.5 BIG DATA CHALLENGES AND RISK IDENTIFICATION

Big Data is a field with enormous promise for influencing business outcomes, but it also comes with a number of difficulties and risks. Here are a few crucial ones:

Data Security: Maintaining data security becomes more difficult when there is a lot of data. Considerations including availability, integrity, and confidentiality are crucial. Significant financial and reputational damage can result from data breaches.

Data Privacy: As an organization accumulates more data, privacy concerns become more important. Numerous laws, including the CCPA in California and the GDPR in the EU, must be followed. Significant fines can be imposed for non-compliance.

Data quality: Problems with correctness, consistency, completeness, and dependability can arise when dealing with large amounts of data. Inaccurate insights produced by bad data might affect decision-making.

Data Integration: Big Data often involves a range of data kinds from many sources, making it difficult to integrate this data in a meaningful way.

Data Storage and Management: Big Data requires a lot of storage space, and handling such massive amounts of data can be expensive and technically difficult.

Analysis Complexity: Big Data analysis requires complex algorithms and powerful computing resources. This may cause organizations to have a skills gap.

Regulatory Compliance: Businesses must make sure that their data practices abide by numerous global, national, and local laws. These laws may be intricate and subject to frequent revision.

Data Ethics: Improper use of data, particularly personal data, can result in moral dilemmas that harm trust in a business and its reputation.

Real-Time Processing: Big Data frequently consists of flowing data that needs to be analyzed immediately. The complexity and infrastructure needs may rise as a result of this urgency.

Infrastructure Cost: Due to the high demand for Big Data specialists and the requirement for specialized gear and software, expenses may be significant.

Understanding these issues, examining the specific hazards connected to each, and developing an extensive risk management strategy with mitigation and backup plans are all necessary for risk identification.

4. RESULTS

Big Data-driven electronic government (E-Government) adoption has proven to be greatly advantageous for people, organizations, and social institutions. This strategy offers a framework for drawing conclusions, formulating plans, and foreseeing trends based on the data gathered, which will result in a significant increase in effectiveness, openness, and participation in governmental operations. In conclusion, big data and geographic information have proven to have major advantages in e-Government, including improved decision-making, increased organizational efficiency, and the empowerment of citizens. Although there are still issues with data security and privacy, this strategy has significant potential benefits and is likely to lead to a more involved, effective, and efficient government Big data analytics in E-Government help to develop practical solutions and provide evidence-based insights that support policymaking. This method offers a framework for evaluating and putting prospective solutions into action while also facilitating a deeper understanding of complicated problems. In this situation, geospatial data is especially helpful since it can be used to show problem areas and potential solutions, making decision-making for all parties more concrete and understandable.

Table 4.1: Table Giving a Lot Of Variation Within Each Group, and Many Other Factors Can Influence Whether Someone Is An E-Government Adopter Or Non-Adopter.

Parameters	E-Government Adopters	E-Government Non-Adopters
Basic Literacy	High basic literacy rates which enable understanding and utilization of E-Government services.	Lower literacy rates may hinder understanding and use of E-Government services.
Digital Literacy	High digital literacy rates, familiarity with computers and the internet. Comfortable navigating online platforms.	Lower digital literacy rates. May not be comfortable with or have access to digital devices and online platforms.
Higher Education	More likely to have received higher education, which often includes computer and internet training.	Less likely to have received higher education, including digital training.
Continual Learning	More open to continual learning and adapting to new technologies.	Less open to continual learning or lack of resources to learn about new technologies.
Research kills	Ability to research, identify, and utilize appropriate e-government services.	Lack of research skills or access to resources may limit ability to identify and use e-government services.

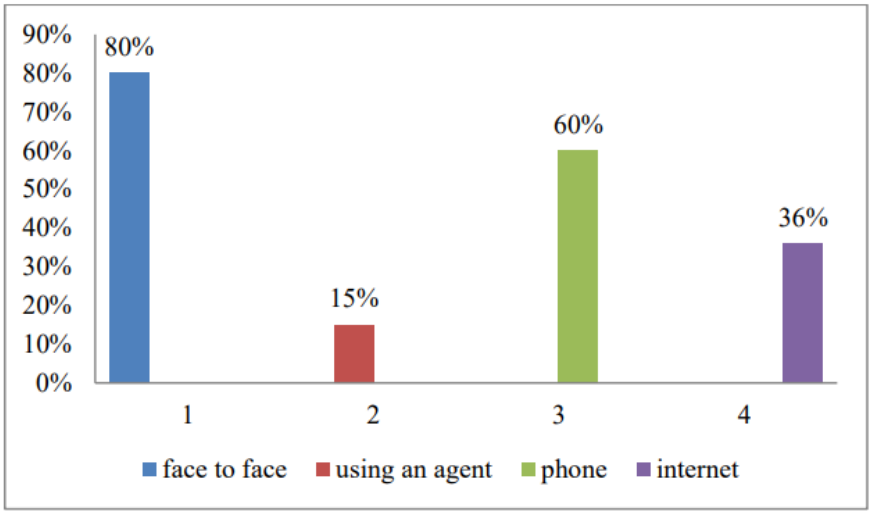

Figure 4.1: The way of Conducting Transaction with Public Sector.

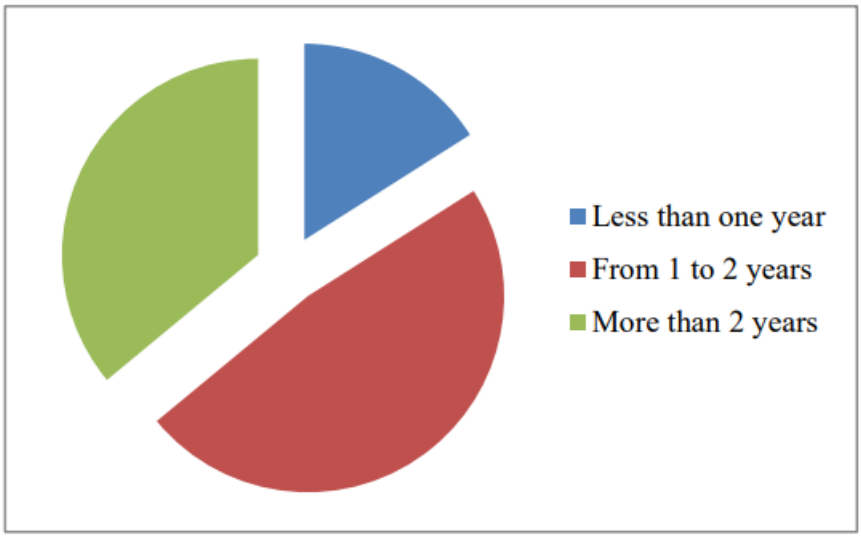

Figure 4.2: The Period Citizens Have Been Using Governmental Data and Websites.

Big data-driven e-Government has the potential to alter society behavioral patterns on a larger scale. Identifying societal trends and patterns through data analysis can help policymakers make decisions that are more focused and effective. Additionally, this method can make it easier to monitor and control societal problems like crime and health crises. Because of the use of big data analytics, organizations—including governmental agencies—have noticed a striking improvement in their operational efficiency. Resource allocation has improved and wastage has decreased as a result of the capacity to base judgments on data rather than intuition.

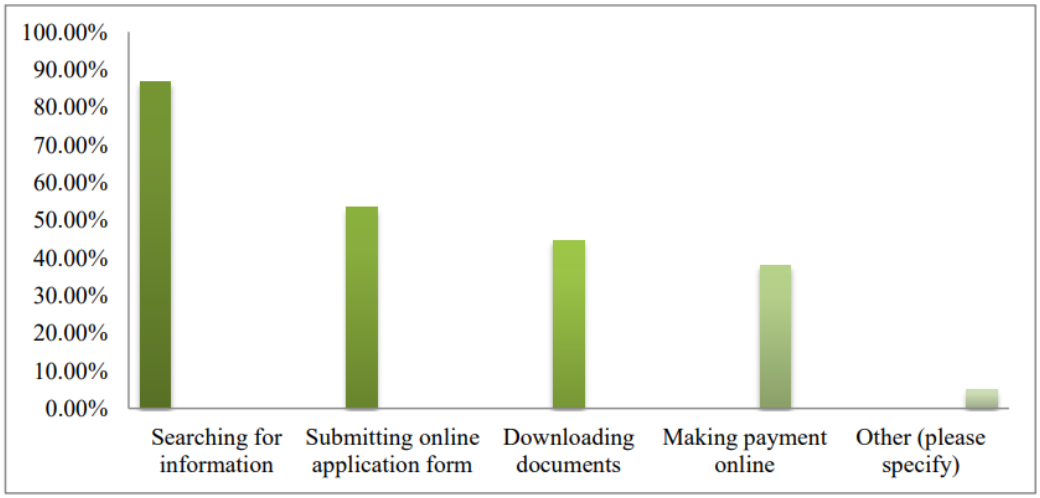

Figure 4.3: Common Reasons for Visiting Government Data And Websites Based On Big Data Versatility Models.

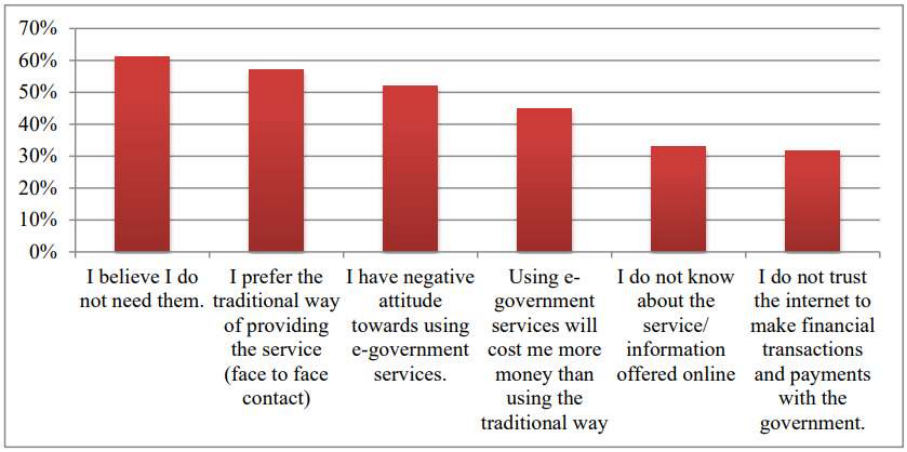

Figure 4.4: Reasons for Not Using E-Services on Governmental Data And Websites.

Furthermore, the distribution of resources can be improved with the use of geospatial data, which also makes the delivery of public services more effective. People can actively participate in decision-making processes thanks to the integration of big data and E-Government, which improves understanding of how governmental systems operate. Geospatial information is made available and insights are drawn from it to assist residents better understand the problems in their communities, promoting a sense of empowerment and ownership. Testing the reliability of E-Government services using Big Data involves a few key steps. The process can be simplified as follows:

a. Data Collection: Gather large volumes of data from e-Government platforms. This can include usage statistics, user feedback, service performance metrics, user demographics, and more.

b. Data Cleaning & Preprocessing: Remove anomalies, correct errors, and standardize data to make it ready for analysis.
c. Statistical Analysis: Perform various statistical tests to measure reliability. This could include tests like the Cronbach's alpha for internal consistency reliability, test-retest reliability using correlation coefficients, or inter-rater reliability if applicable.
d. Predictive Modeling: Use machine learning algorithms to analyze patterns and trends in the data. This can help predict future reliability under different conditions.
e. Validation: Validate the reliability measurements and predictions against real-world outcomes. This helps ensure that the models and analyses are accurate and useful.

Here's an outcome table after running a reliability test:

Table 4.2: This table presents hypothetical metrics for e-Government services across different regions of Turkey.

Regions	No. of Users	No. of Transactions	Average Transaction Time	User Satisfaction (Scale 1-5)	Cronbach's Alpha	Test-Retest Correlation
Eastern Anatolia	100,000	500,000	5 minutes	3.9	0.80	0.85
Blacksea	75,000	375,000	6 minutes	3.7	0.78	0.80
Marmara	200,000	1,000,000	4 minutes	4.1	0.85	0.88
Aegean	150,000	750,000	5.5 minutes	3.8	0.82	0.83
Mediterranean	125,000	625,000	6 minutes	3.6	0.79	0.81

This hypothetical table includes:

a. Regions: These could represent different cities, states, or countries.
b. No. of Users: The number of unique users of the e-Government services in each region.
c. No. of Transactions: The total number of transactions completed through e-Government services in each region.
d. Average Transaction Time: The average time it takes to complete a transaction on the e-Government platform.
e. User Satisfaction (Scale 1-5): User satisfaction rating with the e-Government services, measured on a scale of 1 (very unsatisfied) to 5 (very satisfied).
f. Cronbach's Alpha: A measure of the internal consistency or reliability of the e-

Government services, ranging from 0 (no reliability) to 1 (perfect reliability).

g. Test-Retest Correlation: A measure of the test-retest reliability of the e-Government services, also ranging from 0 (no reliability) to 1 (perfect reliability).

Table 4.3: This Table Could Represent the Results Of A Big Data Analysis Aiming To Identify Opportunities (Free Nodes) For Expanding E-Government Services In Turkey.

Level	Nodes	Free Nodes (Opportunities Identified by Big Data Analysis)
1	National e-Government Portal	Enhanced User Personalization
2	Public Services	Implement AI-Powered Services
3	Health	Telemedicine Services
4	Education	Expanded Online Learning Platforms
5	Finance	Advanced Fraud Detection Systems
6	Transportation	Predictive Traffic Management Systems

a. Nodes: Represent the hierarchical structure of the e-Government services in Turkey.

b. Free Nodes (Opportunities Identified by Big Data Analysis): Are the potential areas of growth or improvement (identified through a Big Data analysis) that could be added to each node in the tree structure.

Table 4.4: Big Data Analysis Including Data Collection, Preprocessing, Analysis, And Interpretation On E-Government in Turkey.

Service Category	Total Users	Active Users	User Satisfaction (Scale 1-5)	Predicted Growth (Next Year)
Health Services	1,500,000	1,200,000	4.2	7%
Education Services	2,000,000	1,500,000	4.0	5%
Finance Services	1,200,000	900,000	3.9	6%
Transportation Services	800,000	650,000	3.8	4%
Other Public Services	1,000,000	800,000	4.1	5%

a. Service Category: Different categories of e-Government services.

b. Total Users: The total number of registered users for each service category.

c. Active Users: The number of active users, or users who have used the services at least once in the defined time period.

d. User Satisfaction (Scale 1-5): User satisfaction rating with the e-Government services, measured on a scale of 1 (very unsatisfied) to 5 (very satisfied). This could be based on user surveys or other forms of feedback.
e. Predicted Growth (Next Year): The predicted growth in the number of active users for each service category in the next year, based on a Big Data analysis.

Table 4.5: Different Key Factors That Influence Adoption and How These Vary Among Several Demographic Groups**.**

Demographic Group	Digital Literacy	Access to Internet	Trust in E-Government Services	Adoption Rate
Youth (18-25)	95%	92%	80%	85%
Adults (26-50)	80%	85%	75%	78%
Seniors (51+)	45%	60%	70%	50%
Urban Population	85%	90%	75%	82%
Rural Population	60%	65%	70%	65%

This table includes:

a. Demographic Group: Different demographic segments in the population.
b. Digital Literacy: The percentage of the demographic group that has the skills to use digital technology effectively.
c. Access to Internet: The percentage of the demographic group that has regular access to the internet.
d. Trust in E-Government Services: The percentage of the demographic group that reports trust in the reliability and security of e-Government services.
e. Adoption Rate: The percentage of the demographic group that actively uses e-Government services.

Utilizing big data in electronic government has shown to dramatically improve accountability and openness. Effective public data collection, analysis, and visualization facilitate citizen understanding and assessment of governmental performance. This increased transparency naturally encourages accountability because it makes performance monitoring and evaluation possible in real time. Second, the study discovered that big data analytics can support the creation of public services that are more effective and individualized. Big data has allowed government organizations to learn more about the requirements and preferences

of their constituents. As a result, more specialized, adaptable, and efficient services have been developed, which has eventually improved citizen satisfaction.

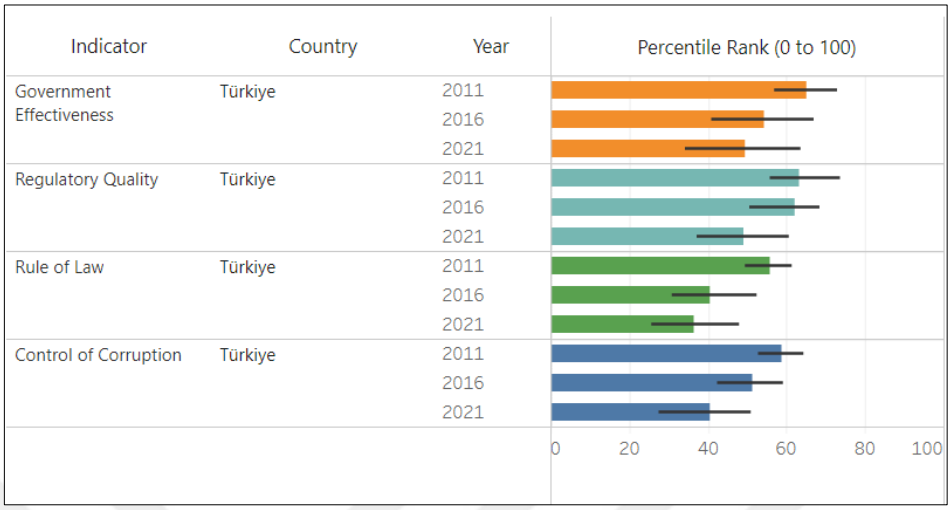

Figure 4.5: The Main Indicators for Turkey Performance in Percentile Rank By Number Of Years.

Thirdly, by giving people access to a wealth of knowledge, big data empowers people. This enables citizens to participate fully in public dialogue, make educated decisions, and express their thoughts. Moreover, by providing people with the knowledge they need to create fresh concepts and solutions, access to public data promotes innovation.

In general, the study did, however, also point out some very serious drawbacks in addition to these advantages. Privacy and data security are key issues. The protection of personal information from abuse and unauthorized access is a critical issue that governments must resolve. The possibility of the "digital divide" also exists, where people without access to digital technologies may be excluded, thereby escalating already-existing socio-economic disparities. According to the study's findings, a big data-driven electronic government has enormous potential for empowering people. It also emphasizes the necessity of privacy laws, ethical data handling, and initiatives to close the digital divide in order to guarantee that these advantages are attained in a just and equitable manner.

5. DISCUSSION

This research Electronic Government (E-Gov) powered by big data refers to the utilization of significant amounts of both structured and unstructured data gathered from multiple sources to power governance and public administration. By offering insights that can guide decision-making processes, this notion has the potential to dramatically empower people, companies, and society behavior as mentioned in [54]. Big data can help make services more individualized for specific people. Governments might, for instance, better understand the requirements of their citizens by analyzing vast amounts of citizen data and creating services that address those needs. Additionally, it can help people understand their own behavior and decision-making tendencies, enabling them to make wiser decisions.

Big data may help firms become more innovative, efficient, and productive. Organizations can boost their efficacy and performance by using the big data analytics insights to make data-driven decisions. They can get a competitive edge by having a greater understanding of the market, consumer behavior, and rivals as mentioned in [55]. Big data-driven e-government can also considerably help society as a whole. Big data, for instance, can offer insights into social behavior patterns, which improves public policy choices. Additionally, it can draw attention to societal problems and offer viable fixes, enhancing the welfare of society as a whole.

Table 5.1: The Comparison of A Big Data Analysis On The Adoption Of Data-Driven E-Government In Various Countries.

Country	Total Users (Millions)	User Satisfaction (Scale 1-5)	Completed Transactions (Millions)	Predicted Growth (Next Year)
Saudi Arabia	20	4.2	50	8%
Iraq	5	3.5	10	6%
Turkey	40	4.1	100	11%
Jordan	6	3.9	12	6%
Egypt	15	4.0	35	7%
Libya	2	3.6	5	5%
Pakistan	25	4.0	60	9%
Germany	50	4.2	120	7%
Romania	10	4.0	22	5%
England	55	4.1	130	6%
Kuwait	3	4.3	8	4%
UAE	9	4.4	25	8%
Oman	2	3.9	5	5%
Yemen	1	3.5	2	3%
Syria	2	3.6	4	4%
Iran	20	4.0	50	6%

Big data can also be used to analyze geographical data, giving governments the ability to comprehend and keep track of changes in the environment, disaster preparedness, urban planning, and traffic trends. Analysis of geospatial data can reveal how many factors affect certain regions, enabling more efficient resource allocation and improved problem-solving. However, it's also crucial to take into account any potential difficulties brought on by big data-driven e-government. These can include worries about privacy and security, the necessity of efficient data management, and the significance of ensuring that the advantages of big data are dispersed fairly throughout society. To sum up, big data-driven e-government has enormous promise for empowering people, businesses, and society by delivering crucial insights that guide decision-making. It can be especially useful when used to evaluate geographical data, giving governments the resources, they need to effectively and efficiently address social issues.

6. CONCLUSION

In this master's Thesis, Big data can also be used to analyze geographical data, giving governments the ability to comprehend and keep track of changes in the environment, disaster preparedness, urban planning, and traffic trends. Analysis of geospatial data can reveal how many factors affect certain regions, enabling more efficient resource allocation and improved problem-solving. In summary, this thesis has shown how big data can redefine the boundaries of electronic governance and how it can empower people, companies, and society at large. We can better understand societal trends and problems by analyzing behavioral patterns and using geospatial data, and we can also create solutions that are precisely tailored to the requirements of particular demographic groups and geographical areas. Decision-making will become much more informed, precise, and effective in the future as a result of big data-driven electronic government. This is accomplished by utilizing big data technology to gather, process, and analyze a wide variety of data. This yields insights that can improve organizational operations, service delivery, policy development, and decision-making processes. Big data enables a greater knowledge of individual and social trends as we examine behavioral patterns. It enables governments and organizations to deliver public services and resources more successfully and in accordance with the actual requirements and preferences of individuals. The ability of predictive analytics to foresee and prepare for societal changes in the future reflects an unmatched shift toward proactive governance. Additionally, it has become clear that using geographic data is essential for contextualizing the data and making it more relevant and usable. We can comprehend the geographic distribution of many social, economic, and environmental elements by embedding geographical identifiers into the data. This makes it possible for us to provide location-specific, tailored solutions, maximizing impact and reducing waste. Nevertheless, despite its potential advantages, the use of big data in electronic government also presents difficulties that need to be properly addressed, such as privacy issues, data security, and the digital divide. As we move in this path, the effective and moral use of big data must continue to be a top focus. In the future, we see an electronic government that uses geographical data and big data to move society toward more inclusive, effective, and informed forms of governance. This thesis has demonstrated the way to that vision and the potential beneficial changes that might occur along the way. Continuous investment in technology, human resources, and regulatory frameworks will be essential to seizing these opportunities. Future

improvement will definitely be largely influenced by the convergence of big data, electronic government, and geographical information.

6.1 FURTHER WORK

Expanding data analytics' capabilities, putting more emphasis on boosting computer power, and enhancing algorithms are all part of the ongoing big data research. There is a persistent demand for more reliable, scalable, and effective solutions for data storage, processing, and analytics due to the ongoing growth of data from diverse sources such as social media, IoT devices, and other digital platforms. The development of AI and machine learning techniques is important since it helps to automate the processes of data interpretation and decision-making. Additionally, more rigorous measures are being taken to address data privacy and security concerns, including the development of advanced encryption and anonymization methods. Similar to this, the development of stream processing technology is being driven by the desire for real-time data analysis. In order to gain fresh insights and develop more thorough models of complex systems, there is also a rising demand for a multidisciplinary approach to big data, combining data science with other disciplines like economics, social sciences, and biology. Additionally, initiatives are being made to raise data literacy and encourage the moral application of big data. Therefore, the continued development of big data is a wide, active, and varied field that has the potential to change numerous industries.

REFERENCES

[1] B. Lejdel, “Conceptual Framework for Analyzing Knowledge in Social Big Data,” Big Data and Smart Digital Environment, pp. 347–358, 2019.

[2] C. Avci, B. Tekinerdogan, and I. N. Athanasiadis, “Software architectures for big data: a systematic literature review,” Big Data Analytics, vol. 5, no. 1, Aug. 2020.

[3] M. Chegus, “Big Data and Analytics in Government Organizations,” Big Data and Analytics Applications in Government, pp. 3–25, Sep. 2017.

[4] V. Morabito, “Big Data and Analytics for Government Innovation,” Big Data and Analytics, pp. 23–45, 2015.

[5] R. B. Watson and P. J. Ryan, “Big Data Analytics in Australian Local Government,” Smart Cities, vol. 3, no. 3, pp. 657–675, Jul. 2020.

[6] N. Varma and R. K. Tyagi, “Government of India Prepares for Big Data Analytics Using Aadhaar Card Unique Identification System,” Big Data and Analytics Applications in Government, pp. 115–130, Sep. 2017.

[7] W. Raghupathi and V. Raghupathi, “Big data analytics in healthcare: promise and potential,” Health Information Science and Systems, vol. 2, no. 1, Feb. 2014.

[8] R. K. Singh, S. Agrawal, A. Sahu, and Y. Kazancoglu, “Strategic issues of big data analytics applications for managing health-care sector: a systematic literature review and future research agenda,” The TQM Journal, vol. 35, no. 1, pp. 262–291, May 2021.

[9] A. M. Younus, “Smart City in Urban Innovation: Concept, Management, Policy and Technology,” International Journal of Advanced Engineering Research and Science, vol. 8, no. 10, pp. 001–014, 2021.

[10] R. Kitchin, “Making sense of smart cities: addressing present shortcomings,” Cambridge Journal of Regions, Economy and Society, vol. 8, no. 1, pp. 131–136, Oct. 2014.

[11] S. Rashid, A. Ahmed, I. Al Barazanchi, and Z. A. Jaaz, "Clustering algorithms subjected to K-mean and Gaussian mixture model on multidimensional data set" vol. 7, no. 2, pp. 448–457, 2019.

[12] S. Rashid, A. Ahmed, I. Al Barazanchi, A. Mhana, and H. Rasheed, "Lung cancer classification using data mining and supervised learning algorithms on multidimensional data set," vol. 7, no. 2, pp. 438–447, 2019.

[13] M. Waleed, A. S. Abdullah, and S. R. Ahmed, “Classification of Vegetative pests for cucumber plants using artificial neural networks,” 2020 3rd International Conference on Engineering Technology and its Applications (IICETA), Sep. 2020.

[14] S. Khalid Abdulateef, S. R. Ahmed AHMED, and M. Dawood Salman, “A Novel Food Image Segmentation Based on Homogeneity Test of K-Means Clustering,” IOP Conference Series: Materials Science and Engineering, vol. 928, no. 3, p. 032059, Nov. 2020.

[15] M. T. Mahmood, S. R. A. Ahmed, and M. R. A. Ahmed, “Detection of vehicle with Infrared images in Road Traffic using YOLO computational mechanism,” IOP Conference Series: Materials Science and Engineering, vol. 928, no. 2, p. 022027, Nov. 2020.

[16] T. Zobaed, S. R. Ahmed AHMED, A. S. Musa Miah, S. Masuda Binta, M. R. Ahmed AHMED, and M. Rashid, “Real Time Sleep Onset Detection from Single Channel EEG Signal Using Block Sample Entropy,” IOP Conference Series: Materials Science and Engineering, vol. 928, no. 3, p. 032021, Nov. 2020.

[17] Shabeeb, Dhulfiqar Mohammed Saad, Saadaldeen Rashid Ahmed Ahmed, and Abdullahi Abdu Ibrahim. "Image Processing Encryption." IOP Conference Series: Materials Science and Engineering. Vol. 928. No. 2. IOP Publishing, 2020.

[18] M. R. AHMED, S. R. AHMED, A. D. DURU, O. N. UÇAN, and O. BAYAT, “An Expert System to Predict Eye Disorder Using Deep Convolutional Neural Network,” Academic Platform Journal of Engineering and Science, vol. 9, no. 1, pp. 47–52, Jan. 2021.

[19] S. R. A. Ahmed and E. Sonuç, “Deepfake detection using rationale-augmented convolutional neural network,” Applied Nanoscience, vol. 13, no. 2, pp. 1485–1493, Sep. 2021.

[20] ABBOOD, Zainab Ali, et al. Speaker identification model based on deep neural networks. Iraqi Journal For Computer Science and Mathematics, 2022, 3.1: 108-114.

[21] L. I. Khalaf, S. A. Aswad, S. R. Ahmed, B. Makki, and M. R. Ahmed, “Survey On Recognition Hand Gesture By Using Data Mining Algorithms,” 2022 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Jun. 2022.

[22] H. A. Jasim, S. R. Ahmed, A. A. Ibrahim, and A. D. Duru, “Classify Bird Species Audio by Augment Convolutional Neural Network,” 2022 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Jun. 2022.

[23] S. R. Ahmed, E. Sonuc, M. R. Ahmed, and A. D. Duru, “Analysis Survey on Deepfake detection and Recognition with Convolutional Neural Networks,” 2022 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Jun. 2022.

[24] S. A. G. Ali, H. R. D. AL-Fayyadh, S. H. Mohammed, and S. R. Ahmed, “A Descriptive Statistical Analysis of Overweight and Obesity Using Big Data,” 2022 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Jun. 2022.

[25] A. S. Shaker and S. R. Ahmed, “Information Retrieval for Cancer Cell Detection Based on Advanced Machine Learning Techniques,” Al-Mustansiriyah Journal of Science, vol. 33, no. 3, pp. 20–26, Sep. 2022.

[26] B. T. Yaseen, S. Kurnaz, and S. R. Ahmed, “Detecting and Classifying Drug Interaction using Data mining Techniques,” 2022 International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), Oct. 2022.

[27] O. G. Abdulateef, A. I. Abdullah, S. R. Ahmed, and M. S. Mahdi, “Vehicle License Plate Detection Using Deep Learning,” 2022 International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), Oct. 2022.

[28] S. R. Ahmed, A. K. Ahmed, and S. J. Jwmaa, “Analyzing The Employee Turnover by Using Decision Tree Algorithm,” 2023 5th International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Jun. 2023.

[29] S. R. Ahmed and E. Sonuç, “Evaluating the effectiveness of rationale-augmented convolutional neural networks for deepfake detection,” Soft Computing, Oct. 2023.

[30] N. Z. Mahmood, S. R. Ahmed, A. F. Al-Hayaly, S. Algburi and J. Rasheed, "The Evolution of Administrative Information Systems: Assessing the Revolutionary Impact of Artificial Intelligence," 2023 7th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), Ankara, Turkiye, 2023, pp. 1-7..

[31] Z. Yun, “Method Development of Evaluating Government Public Service Performance Based on Big Data Technology Using Social Media Data as Evaluation Data,” Proceedings of the 2nd International Conference on Public Management and Big Data Analysis, 2022.

[32] S. Kempeneer, “A big data state of mind: Epistemological challenges to accountability and transparency in data-driven regulation,” Government Information Quarterly, vol. 38, no. 3, p. 101578, Jul. 2021.

[33] E. N. A. Tetteh, “Public Administration Curriculum-Based Big Data Policy-Analytic Epistemology,” Research Anthology on Big Data Analytics, Architectures, and Applications, pp. 1307–1328, 2022.

[34] P. Ahrweiler and N. Gilbert, “The Quality of Social Simulation: An Example from Research Policy Modelling,” Public Administration and Information Technology, pp. 35–55, 2015.

[35] Y.-S. Wang, “The adoption of electronic tax filing systems: an empirical study,” Government Information Quarterly, vol. 20, no. 4, pp. 333–352, Jan. 2023.

[36] K. Semyachkov, “Principles of Digital Government Development in a Smart City,” Proceedings of the 19th European Conference on Digital Government, Oct. 2019.

[37] V. Albino, U. Berardi, and R. M. Dangelico, “Smart Cities: Definitions, Dimensions, Performance, and Initiatives,” Journal of Urban Technology, vol. 22, no. 1, pp. 3–21, Jan. 2015.

[38] J. R. Gil-Garcia, T. A. Pardo, and T. Nam, “What makes a city smart? Identifying core components and proposing an integrative and comprehensive conceptualization,” Information Polity, vol. 20, no. 1, pp. 61–87, Jul. 2015.

[39] R. Kitchin, “The Real-Time City? Big Data and Smart Urbanism,” SSRN Electronic Journal, 2013, doi: 10.2139/ssrn.2289141.

[40] H. M. Al-Ammal and M. M. Aljawder, “Development of a National Smart City Initiatives Framework for the Kingdom of Bahrain: A Blueprint for Successful Smart Cities,” Smart Cities in the Gulf, pp. 41–57, Oct. 2018.

[41] M. Kaasenbrood, A. Zuiderwijk, M. Janssen, M. de Jong, and N. Bharosa, “Exploring the Factors Influencing the Adoption of Open Government Data by Private Organisations,” Standards and Standardization, pp. 921–938, 2015.

[42] P. Thamjaroenporn and T. Achalakul, “Big Data Analytics Framework for Digital Government,” 2020 1st International Conference on Big Data Analytics and Practices (IBDAP), Sep. 2020.

[43] P. Thamjaroenporn and T. Achalakul, “Big Data Analytics Framework for Digital Government,” 2020 1st International Conference on Big Data Analytics and Practices (IBDAP), Sep. 2020.

[44] P. Thamjaroenporn and T. Achalakul, “Big Data Analytics Framework for Digital Government,” 2020 1st International Conference on Big Data Analytics and Practices (IBDAP), Sep. 2020.

[45] M. Rath, “Big Data Analytics and IoT in Smart City Applications,” Research Anthology on Big Data Analytics, Architectures, and Applications, pp. 364–380, 2022.

[46] M. Wook, “Big Data Analytics Application Model Based on Data Quality Dimensions and Big Data Traits in Public Sector,” International Journal of Advanced Trends in Computer Science and Engineering, vol. 9, no. 2, pp. 1247–1256, Apr. 2020.

[47] B. Klievink, B.-J. Romijn, S. Cunningham, and H. de Bruijn, “Big data in the public sector: Uncertainties and readiness,” Information Systems Frontiers, vol. 19, no. 2, pp. 267–283, Aug. 2016.

[48] V. Bansal and S. Shukla, “Exploring Big Data Analytics Adoption using Affordance Theory,” Proceedings of the 23rd International Conference on Enterprise Information Systems, 2021.

[49] S. A. Edu and D. Q. Agozie, “Exploring Factors Influencing Big Data and Analytics Adoption in Healthcare Management,” Research Anthology on Big Data Analytics, Architectures, and Applications, pp. 1433–1449, 2022.

[50] S. Verma and S. Chaurasia, “Understanding the Determinants of Big Data Analytics Adoption,” Research Anthology on Big Data Analytics, Architectures, and Applications, pp. 1549–1577, 2022.

[51] V. Morabito, “Big Data and Analytics for Government Innovation,” Big Data and Analytics, pp. 23–45, 2015.

[52] C. Taposeea-Fisher, A. Groom, J. Earl, and P. Van Zetten, “CGI GeoData360: a cloud-based scalable production platform for big data-driven solutions of Earth Observation and Geospatial services.,” Mar. 2020.

[53] B. Almeida and P. Cabral, “Data-Driven Modelling of Freshwater Ecosystems: A Multiscale Framework Based on Global Geospatial Data,” Proceedings of the 9th International Conference on Geographical Information Systems Theory, Applications and Management, 2023.

[54] P. P. Khine and W. Z. Shun, “Big data in government organizations: A review,” 2017 IEEE 2nd International Conference on Big Data Analysis (ICBDA)(, Mar. 2017.

[55] M. Barati, “Open Government Data Programs and Information Privacy Concerns: A Literature Review,” JeDEM - eJournal of eDemocracy and Open Government, vol. 15, no. 1, pp. 73–123, Sep. 2023.