

## **Digital Local Administration as a Mechanism for Improving Public Services: The Case of Singapore**

**Dr. Souigat Abderrazak**

University of ghardaia.Algeria

Email: souigat.abderrazak@univ-ghardaia.edu.dz

**Received: 24/05/2023 ; Accepted: 11/10/2023 ; Published: 06/12/2023**

### **Abstract:**

This study aims to explore the importance of Digitisation of Local Administration in Singapore by analyzing how such digitalization contributes to the improvement of public services. The study is divided into two main topics. The first topic provides the conceptual framework of the study, where we define the digitalization of local Administration and discuss its role in enhancing public services. The second topic focuses on digital local Administration in Singapore, examining the role of Digitisation of Local Administration in improving public services as well as the challenges associated with digital transformation in the country. A case study methodology was employed. The findings highlight how Singapore's experience in digitalizing local Administration demonstrates the potential of technology as an effective tool for achieving substantial improvements in public services. Through the adoption of innovative strategies, Singapore has successfully enhanced service quality, promoted transparency, and bridged the gap between citizens and local administration.

**keywords:** Digitization, Local Administration, Digital Local, Administration, E-Governance, E-Government.

### **Introduction:**

After the digital revolution that the world has witnessed in recent decades, various governments are seeking effective ways to leverage digital technology to enhance public services and enable citizens to contribute meaningfully to addressing local issues.

In this context, Local Administration has emerged as a central axis of digital transformation, as it directly addresses the daily needs of individuals. Among the leading global models, Singapore's experience stands out, having successfully integrated digitization across various aspects of its local administration, making it a benchmark for governmental innovation and administrative efficiency.

This study aims to highlight the significance of digitizing Local Administration as a mechanism for improving public services in Singapore by posing the following main research question: How does the digitization of local Local Administration contribute to improving public services in Singapore? This overarching question is further divided into the following sub-questions: What is the concept of digitization? What are the digital mechanisms employed in local Administration to enhance public services in Singapore?

To answer the main research question and its sub-questions, we adopted the case study approach and structured the study into two main topics. The first topic covers the conceptual framework of the study, divided into two requirements: the first requirement defines the digitization of Local Administration, and the second requirement explores its role in improving public services. The second topic focuses on digital local Administration in Singapore, also divided into two requirements: the first requirement examines the role of digitization in improving public services in Singapore, and the second requirement addresses the challenges of digital transformation in the country.

### **the first Topic Conceptual Framework of the Study**

In this section of the study, we will discuss the definition of the digitalization of local governance, as well as the objectives of local governance digitalization.

#### **The first requirement: Definition of the Digitalization of Local Administration**

We will attempt to provide the definitions provided by the United Nations, the Organisation for Economic Co-operation and Development (OECD), as well as the definition proposed by researcher Richard Heeks.

#### **United Nations Definition**

" Digitisation of Local Administration refers to the use of information and communication technologies (ICT) to improve the delivery of public services, enhance transparency, and increase citizen participation in local decision-making." (United Nations E-Government Survey, 2022, pp. 45–50)

## **OECD Definition**

"The process of transforming local Administration through the adoption of digital technology, aimed at improving operational efficiency and delivering innovative services that better meet the needs of citizens." (OECD, 2019, p. 23)

## **Academic Definition from Richard Heeks' Study**

Digitisation of Local Administration means integrating digital technologies into the administrative processes and services at the local government level, contributing to operational efficiency, enhancing transparency, and improving interaction with citizens." (Heeks, 2006, p. 75)

## **The second requirement: The role of digitising local administration in improving public services**

The digitisation of local administration aims to achieve a range of objectives related to improving the efficiency of administrative processes, facilitating access to services, enhancing community participation, reducing operational costs, and enhancing transparency and accountability

### **a)- Improving Administrative Process Efficiency**

#### **1) -Automation of Routine Processes**

Automation of administrative processes is one of the main outcomes of digitalization, where traditional paper-based procedures are transformed into integrated digital systems. This transformation reduces the time required to complete routine tasks, such as registering applications or processing documents, thereby increasing the efficiency of administrative operations. For instance, digital systems can process thousands of applications in a short period, compared to traditional methods. (Heeks, 2006, p. 98)

#### **2) -Reduction of Human Errors**

Traditional processes rely heavily on human intervention, which increases the likelihood of errors. Digitalization allows tasks to be performed with greater accuracy through the use of software and algorithms that minimize mistakes and ensure that processes comply with predefined standards. This not only improves the quality of work but also enhances citizen satisfaction with the services provided.

### **3) -Promoting Innovation in Service Delivery**

Digitisation allows local administrations to explore new ways of delivering services, such as using smartphone apps or artificial intelligence systems to analyse citizen data. These innovations help to improve the quality of service delivery and make it more in line with citizens' changing expectations and needs (United Nations, 2020, E-Government Survey 2020, p. 105)

The digitisation of local administration transforms the efficiency of administrative processes by improving speed, reducing errors, and lowering costs. It also contributes to fostering a collaborative work environment and innovation in service delivery, enhancing citizen satisfaction and achieving sustainable administrative development.

#### **b)-Facilitating Access to Services**

##### **1) -Providing Services Online**

One of the key advantages of digitalization is the availability of administrative services online, enabling citizens to access them easily from anywhere and at any time. Instead of visiting administrative offices, citizens can submit applications, pay fees, and obtain official documents through online portals. This transformation helps reduce the effort and time needed to complete services. (United Nations, 2020, E-Government Survey 2020, p. 52)

##### **2) -Overcoming Geographic Barriers**

In remote or rural areas, the distance between citizens and administrative offices can be a major obstacle. Digitalization allows citizens in these areas to access services online without the need to travel. This promotes the inclusiveness of administrative services and reduces disparities between urban and rural areas in accessing services. (OECD, 2019, Government at a Glance 2019, p. 166)

##### **3) -Improving Response Speed and Accuracy**

"Digitalization reduces traditional bureaucracy through electronic management systems that speed up transaction completion and provide accurate tracking mechanisms. When citizens receive services efficiently and transparently, complaints about mismanagement decrease, and trust in the integrity of local institutions increases." (World Bank, 2019, *The Changing Nature of Work*, p. 112).

The digitisation of local administration is a paradigm shift in facilitating citizens' access to services, removing geographical and administrative barriers, streamlining traditional processes, and providing personalised services that meet the needs of individuals. Through these transformations, digitisation creates a better citizen experience and improves the overall efficiency of local administration.

### **c)-Enhancing Community Participation**

#### **1) -Providing Effective Communication Channels with Citizens**

Through digitisation, local administrations provide interactive communication channels, such as online platforms and smart applications, that allow citizens to express their opinions and share their thoughts on societal issues. These channels make communication faster and more transparent, making citizens feel like they are part of the decision-making process.

#### **2) -Encouraging Participation in Decision-Making**

Digitisation allows citizens to contribute directly to local decision-making through online surveys and questionnaires. Administrations can also organise digital consultation sessions that give everyone the opportunity to participate, regardless of where they live. These measures contribute to broadening the circle of community participation and making it more inclusive. (United Nations, 2022, *United Nations E-Government Survey 2022*, p. 25).

By digitising processes and communication, local administrations are opening up new horizons to enhance community engagement. These efforts create an interactive environment that encourages citizens to engage in community issues, leading to a more transparent, inclusive and collaborative society.

### **d)-Reducing Operational Costs**

#### **1) -Reducing Dependence on Paper and Physical Resources**

Paper-based document management is a contributing factor to increased operational costs. Through digitisation, local administrations can eliminate the need for paper, ink, and other stationery, thereby reducing costs. For example, paper files can be replaced by digital document management systems, reducing the need to store and maintain physical documents.

## **2) -Reducing the Need for Staff**

Digitalization has helped automate many administrative processes that previously required substantial human intervention. By using digital systems, the number of staff needed for routine tasks such as processing applications or reviewing documents can be reduced. This automation lowers the costs associated with salaries and benefits. (Heeks, 2006, p. 112)

The digitisation of local administration contributes to reducing operational costs by reducing reliance on paper, improving resource allocation, and speeding up procedures. In addition, it improves overall efficiency, leading to reduced administrative expenses and more effective delivery of public services to citizens.

## **e)-Enhancing Transparency and Accountability**

### **1) -Increasing Access to Information**

Digitalization enables citizens to easily access information related to procedures and administrative services through online portals and digital platforms. This constant availability of information strengthens the principle of transparency, as individuals can learn about procedures and service costs, thus reducing the likelihood of ambiguity or manipulation.

### **2) -Reducing Opportunities for Corruption**

Digitalization contributes to building integrated systems that allow different departments within local governance to communicate and share data in real time. This collaboration reduces work duplication and enhances collective performance efficiency. Digital systems also help monitor overall performance and identify strengths and weaknesses, improving the management of human and material resources.

### **3) -Strengthening Accountability Mechanisms**

Digitalization provides a digital record of all administrative processes and procedures, making it easier to track any errors or delays in task execution. This record allows local authorities to monitor employees' performance and hold them accountable in case of negligence or misconduct. Furthermore, citizens can submit complaints or feedback via digital platforms, fostering bottom-up accountability.

#### 4) -Enabling Community Oversight

"Technology provides tools for interaction between the administration and the community, such as digital forums or online surveys, where citizens can report corruption issues or suggest improvements for performance. These channels enhance the community's oversight role, making the administration more responsive and transparent in dealing with citizens' needs." (OECD, 2019, *Government at a Glance 2019*, p. 166)

#### **The second Topic: Digital Local Administration in Singapore**

In this topic, we focus on digital local administration in Singapore, focusing on the role of digitising local administration in improving public services in Singapore, as well as the challenges of digital transformation in Singapore

#### **The first requirement: the role of digitization in improving public services in Singapore**

##### a)- **Development of Government Digital Infrastructure in Singapore**

Singapore is one of the leading countries that has successfully developed an integrated government digital infrastructure, which has helped it make significant progress in digitizing public services. This transformation began in the early 2000s, with the Singaporean government adopting innovative strategies to build a robust digital infrastructure that supports the efficient and effective delivery of government services (World Government Summit, 2013, p. 12). In 2016, the government established the *Government Technology Agency* (GovTech), which is responsible for developing advanced technological solutions that contribute to the delivery of government services electronically. One of the key pillars of this infrastructure is the promotion of cloud computing and artificial intelligence (AI) technologies, which have enhanced the government's ability to analyze data and use it to provide more personalized and effective services to citizens. The Singaporean government has made significant investments in expanding high-speed internet networks and providing secure digital platforms for storing government data and citizens' personal information, which enhances transparency and contributes to good governance (GovTech Singapore, 2016, p. 15).

The government has also developed several digital systems that effectively manage government resources, such as the *OneService* platform, which allows citizens to interact with local municipalities to submit complaints, suggestions, or service requests in real-time (GovTech Singapore, 2018, p. 3). Additionally, the *MyInfo* program, a unified digital platform, allows citizens to securely store their

personal information and use it to submit multiple government applications without the need to re-enter data (Smart Nation Singapore, 2016, p. 2).

All of these efforts have contributed to easier access to government services and reduced operational costs, while adding a new level of flexibility in managing government resources. Furthermore, Singapore has worked on integrating data across various government agencies, enabling seamless data exchange between different sectors and public services, which contributes to improving planning and decision-making in the government.

This digital infrastructure has not only facilitated the provision of new services but has also enhanced the flexibility and security of existing systems, allowing the government to respond quickly to challenges and changes that may arise in the future.

#### **b)- The role of local government digitisation in enhancing transparency and accountability in Singapore**

Singapore is an exemplary case in using digitalization to enhance transparency and accountability in local governance. Since the beginning of the digital transformation in the early 2000s, the Singaporean government has implemented innovative strategies aimed at improving transparency and accountability in government transactions through information and communication technologies. In this context, digitalization is a key tool in enabling citizens to track and monitor government processes, thus increasing government effectiveness and strengthening public trust in state institutions.

One of the most prominent digital tools contributing to enhanced transparency is the *Digital Government Services Platform*, which provides easy and secure access to government services (GovTech Singapore, 2018, *Digital Platforms for Transparency*). This platform allows citizens to transparently access government procedures, such as licensing and public tenders, and provides updated information on infrastructure projects and government spending. Other platforms, such as *OneService*, allow citizens to submit complaints or inquiries about public services and track the response status to these complaints online (Smart Nation Singapore, 2016, *OneService: Enhancing Public Engagement*, p. 5).

These digital systems provide clarity in government workflows, enabling citizens to follow up on transaction progress and ensure that regulations and laws are applied fairly. Through the digitalization

of government processes, decision-making in Singapore has become more transparent, as all citizens can review the criteria followed in government decisions (GovTech Singapore, 2018).

This system helps reduce opportunities for corruption by allowing transactions and activities to be reviewed accurately and publicly. For example, details of government tenders are announced through dedicated digital platforms, making it easier for citizens and stakeholders to follow developments in the public sector and ensure that tenders are awarded based on fair and transparent criteria.

Moreover, the open digital data provided by the Singaporean government, such as public budget information and government performance reports, can be used by the press and civil society to analyze government performance and hold it accountable. Additionally, digitalization increases accountability by enabling citizens to directly interact with government officials (World Bank, 2020, *World Development Report 2020: Data for Better Lives*, p. 10).

In this context, citizens can use mobile applications and websites to submit inquiries or opinions about political or social decisions, opening up opportunities for community participation and helping to improve local government management.

Furthermore, the widespread use of big data and predictive analytics by the government contributes to tracking and addressing issues of corruption or mismanagement, enhancing overall performance and reducing opportunities for opaque practices (GovTech Singapore, 2018, p. 9).

Digitalization in Singapore is a critical tool for achieving good governance, as it not only improves the effectiveness of public services but also contributes to building an environment of transparency and accountability that strengthens citizens' trust in state institutions. Through these digital initiatives, citizens can be more engaged and active in public life, which improves the quality of local governance and ensures service delivery in line with internationally recognized standards.

### **c)- The role of digitising local government in improving access to services in Singapore**

Singapore is a pioneer in using digitalization to improve access to public services, as the digital government has developed an advanced infrastructure and interactive electronic platforms aimed at making life easier for citizens. For instance, the *MyInfo* platform is one of the key initiatives offering unified and secure services, allowing citizens to access multiple public services using securely stored, unified data. This platform speeds up processes by reducing the need for citizens to repeatedly input

personal information, saving time and simplifying the process of accessing government services (Smart Nation Singapore, 2016).

Additionally, Singapore continues to improve citizens' access to services through smart applications, such as the *OneService* app, which enables users to interact directly with local municipalities to submit requests or report public facility breakdowns (GovTech Singapore, 2018). Through these applications, citizens can access services without needing to visit government offices, which saves considerable time and effort.

On another front, the Singaporean government has leveraged cloud computing and artificial intelligence to personalize public services according to citizens' needs. Big data collected by digital platforms is analyzed to offer customized services, such as providing individual health tips based on users' medical records or housing recommendations based on family status. This approach highlights how digitalization can go beyond simply improving efficiency to provide a comprehensive experience that focuses on users' needs.

#### **d)- The Role of Digitalizing Local Administration in Enhancing Innovation in Local Services Delivery in Singapore**

Digitalization plays a pivotal role in enhancing innovation in the delivery of local services in Singapore. The government seeks to transform public services through digital technologies to better meet citizens' needs with greater efficiency and flexibility. Since the inception of digital transformation, the Singaporean government has relied on information and communication technologies to develop and improve how public services are delivered, contributing significantly to innovation in local administration. Through digitalizing services, innovative and integrated platforms have been developed, enabling multiple services to be accessed under one roof, thereby reducing procedural complexity and increasing service accessibility speed.

For instance, the "MyInfo" platform stands as a prime example of digital innovation in Singapore. This platform allows citizens to securely store their personal information online and use it for completing various government procedures such as identity renewal, tax payments, or applications for healthcare services (Smart Nation Singapore, 2016, p. 6). By using this platform, the time required to conduct governmental transactions has been significantly reduced, enhancing public service efficiency and making services more integrated and innovative. This initiative exemplifies how technology can simplify citizens' lives and enhance their interaction with local administration.

Furthermore, the digitalization of local services in Singapore has fostered innovation in fields such as transportation. Big data and pattern analysis have been utilized to develop smart solutions to reduce urban congestion and improve public transport networks. Through technologies like the Internet of Things (IoT) and data intelligence, the government has optimized traffic flow and improved public transportation services via smartphone applications that provide real-time traffic and transit information (GovTech Singapore, 2018, p. 10). These innovations have made Singapore's transport services more flexible and efficient, reflecting a significant evolution in local service delivery using information technology.

In summary, the digitalization of local services in Singapore serves as a successful model for fostering governmental innovation. By leveraging modern technologies such as big data, artificial intelligence, and IoT, Singapore has improved the delivery of local services to align with citizens' needs and digital-age demands, enhancing its appeal as a benchmark in digital governance.

#### **e)- The Role of Big Data in Local Administration in Singapore**

Singapore is a pioneer in utilizing big data to enhance the efficiency of local administration and improve the quality of public services. The Singaporean government recognized early on the potential of big data for trend analysis, problem prediction, and decision-making optimization, making it a cornerstone of its digital transformation. The government employs big data to develop evidence-based, comprehensive policies that enhance its ability to meet citizens' needs with precision and effectiveness.

One notable initiative in this context is the Smart Nation Sensor Platform, which collects big data from sensors deployed across the city. This real-time data is used to improve local services, such as traffic management, air quality monitoring, and dynamic resource allocation (GovTech Singapore, 2018, p. 12). For example, traffic patterns are analyzed to provide recommendations to drivers via smart transportation apps, helping to reduce congestion and improve mobility (Smart Nation Singapore, 2021, p. 9).

In housing, big data is employed to optimize urban planning and deliver tailored services. Data analysis algorithms identify residents' housing needs, considering factors like population density, age distribution, and household requirements. The Housing & Development Board leverages this data to create sustainable neighborhoods that address both current and future community needs (Housing & Development Board, 2019, p. 14).

Moreover, big data has been instrumental in improving crisis and emergency response. During the COVID-19 pandemic, the Singaporean government used big data to analyze virus transmission patterns and identify areas requiring urgent intervention. These analyses enabled local administration to efficiently allocate healthcare resources and make informed decisions about health restrictions (Ministry of Health Singapore, 2020, p. 8).

Big data also contributes to enhancing transparency and accountability in local administration. Singapore's open data initiative grants citizens and businesses access to governmental databases covering sectors like education, health, and transportation. This initiative not only improves transparency but also stimulates private sector innovation by encouraging the development of community-serving applications and services (Transparency International, 2021, p. 19).

Furthermore, big data is utilized to enhance oversight and improve government employee performance. Administrative operation data is analyzed to identify weaknesses and implement improvements. For example, processing times for administrative requests are tracked to reduce delays and increase service efficiency.

### **The second requirement: Challenges of Digital Transformation in Singapore**

Despite Singapore's remarkable progress in digital transformation, it faces complex challenges that must be addressed to ensure sustainability in this domain. These challenges span technical, social, and policy dimensions, necessitating innovative and sustainable strategies (World Bank, 2020, p. 45).

One prominent challenge is balancing technological advancement with privacy protection. With the increasing reliance on digital technologies and big data collection, it is imperative to enforce stringent policies to safeguard citizens' data. Although laws like the Personal Data Protection Act (PDPA) exist, concerns about cybersecurity and data breaches persist. The complexity of digital systems makes them susceptible to cyberattacks, requiring substantial investments in cybersecurity and continuous infrastructure upgrades (Cybersecurity Agency of Singapore, 2021, p. 17).

Moreover, digital transformation faces the challenge of inclusivity. Despite government initiatives to train citizens in technology usage and provide user-friendly platforms, a digital divide persists between older generations and younger users. Older citizens may struggle with using digital applications and platforms, necessitating additional investments in training programs and digital literacy education (Smart Nation Singapore, 2021, p. 32).

Another challenge lies in organizational resistance to change within the public sector. While technology serves as an enabler, digital transformation demands fundamental shifts in administrative structures and organizational culture. Some government employees may resist digital transformation due to concerns about job security or difficulties adapting to new technologies. Thus, the government must invest in employee training and raise awareness about the importance of digital transformation for enhancing administrative efficiency (Public Service Division Singapore, 2019, p. 29).

Sustainable financing is also a major hurdle. Implementing large-scale digital projects, such as building advanced infrastructure and developing smart systems, requires significant budgets. With rising operational and developmental costs, the government must explore innovative solutions to fund these projects without straining public finances or imposing additional burdens on citizens (Ministry of Finance Singapore, 2020, p. 14).

Lastly, adapting to rapid technological advancements presents an ongoing challenge. The swift evolution of digital technology necessitates constant updates to Singapore's systems to keep pace with global innovations. This requires flexible policies and the ability to integrate emerging technologies like artificial intelligence and IoT, which demand specialized and often scarce skills (Tech Talent Report, 2021, p. 9).

In conclusion, the challenges of digital transformation in Singapore highlight the need for comprehensive policies aimed at balancing technological innovation with addressing associated social and economic issues. Despite these challenges, Singapore continues to serve as a model for effective digital transformation.

### **Conclusion:**

In light of the rapid changes occurring in the digital world, Singapore's experience in digitizing local administration demonstrates how technology can serve as an effective tool for achieving substantial improvements in public services. The country has successfully adopted innovative strategies that have enhanced service quality, increased transparency, and bridged the gap between citizens and local administration.

Singapore's experience highlights the importance of meticulous planning, investment in digital infrastructure, and the development of human resources to ensure the success of digitization projects. Consequently, it has become a model for countries aspiring to develop their local administrations and achieve sustainable development through the vast potential of digital transformation.

Integrating digitization into local administration is not merely an option but a necessity to meet modern societal aspirations. Studying successful models such as Singapore provides valuable insights into how best to utilize this mechanism to improve public services and enhance citizen well-being.

### **Study Findings:**

The study reached the following conclusions:

- **Improvement in Public Service Quality:**
  - The adoption of digital platforms like *OneService* and *MyInfo* has streamlined administrative processes, reduced bureaucratic procedures, and improved the user experience.
- **Increased Administrative Efficiency:**
  - Utilizing big data analytics has supported data-driven decision-making and optimized resource allocation in local administration.
- **Enhanced Transparency and Accountability:**
  - The implementation of open government systems and digital transparency platforms has reduced corruption and strengthened citizens' trust in government.
- **Strengthened Community Engagement:**
  - Platforms like *MyInfo* have empowered citizens, fostering better interaction with government services and improving the responsiveness of local administrations.
- **Data Security and Privacy:**
  - Advanced cybersecurity policies have been developed to protect citizens' data and boost trust in digital systems.
- **Integration of Modern Technologies:**
  - Incorporating artificial intelligence (AI) and the Internet of Things (IoT) has supported local administration, particularly in managing smart cities and emergency services.

### **Recommendations for Enhancing Local Administration Digitization in Other Contexts:**

- **Strengthening Digital Infrastructure:**
  - Invest in communication networks and technological infrastructure to ensure the continuous and efficient operation of digital systems.

- **Providing Training and Capacity Building:**
  - Organize training programs for government employees and citizens to facilitate digital transformation and minimize resistance to change.
- **Ensuring Cybersecurity:**
  - Adopt robust security strategies to safeguard personal and institutional data against cyberattacks.
- **Promoting Cross-Sector Collaboration:**
  - Foster partnerships between the public and private sectors to drive innovation and develop technological solutions.

## Bibliography:

### 1. books

- **Cybersecurity Agency of Singapore.** (2021). *Protecting Digital Privacy and Security*. Singapore: Cybersecurity Agency of Singapore.pp1-
- **Heeks, R.** (2006). *Implementing and Managing E-Government: An International Text*. SAGE Publications.
- **OECD.** (2019). *Government at a Glance 2019*. Organisation for Economic Co-operation and Development.
- **World Bank.** (2019). *World Development Report 2019: The Changing Nature of Work*. World Bank.
- **World Bank.** (2020). *World Development Report 2020: Data for Better Lives*. World Bank.
- **World Bank.** (2021). *GovTech Maturity Index: The State of Public Sector Digital Transformation*. Washington, D.C.: World Bank
- **United Nations.** (2022). *United Nations E-Government Survey 2022: The Future of Digital Government*. United Nations.

### 2-articles

- **GovTech Singapore.** (2016). *Accelerating Public Service Transformation with the Cloud*.p.14-15
- **Ministry of Finance Singapore.** (2020). *Financing the Future of Digital Infrastructure*. Singapore: Ministry of Finance Singapore.p14.

- **Ministry of Health Singapore.** (2020). *COVID-19 Response through Data-Driven Strategies*. Singapore: Ministry of Health Singapore.p 08.
- **Public Service Division Singapore.** (2019). *Organizational Change in the Digital Age*. Singapore: Public Service Division Singapore.p29.
- **Smart Nation Singapore.** (2021). *Transforming Services with Big Data*. Singapore: Smart Nation Singapore.32
- **Tech Talent Report.** (2021). *Adapting to Rapid Technological Change*. Singapore: Tech Talent Report.p 09
- **Transparency International.** (2021). *Enhancing Transparency through Open Data*. Berlin: Transparency International.p.19

### 3-websites

1. **GovTech Singapore.** (2016). *OneService: Enhancing Public Engagement*. Retrieved from <https://www.smartnation.sg> (Consulted on 01/05/2023).
2. **Housing & Development Board.** (2019). *Urban Planning through Data Analytics*. Singapore: Housing & Development Board. <https://www.hdb.gov.sg/cs/infoweb/homepage>
3. **Smart Nation Singapore.** (2016). *Improving Lives, Supporting Businesses*. Retrieved from <https://www.smartnation.sg>(Consulted on 03/05/2023).
4. **GovTech Singapore.** (2018). *Digital Platforms for Transparency*. Retrieved from <https://www.govtech.gov.sg> (Consulted on 17/04/2023).
5. **World Government Summit.** (2013). *Government Efficiency: Lessons from Singapore*. Retrieved from <https://www.worldgovernmentsummit.org/docs/default-source/publication/2013/arabic> (Consulted on 15/04/2023).
6. **World Bank.** (2020). *Digital Government Transformation*. Retrieved from <https://documents.worldbank.org/en/publication/documents->(Consulted on 16/04/2023).