

# The Role of Information Technology in Advancing Public Service Systems for Society 5.0 and Smart Cities in Yemen

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## Abstract

Smart cities and society 5.0 are two concepts that work well together since they both call for intelligent people who have achieved society 5.0 level. as well as technologically advanced environs. One of the essential components of developing a smart city and the Yemeni society 5.0 is ensuring the efficient operation of an information system. Smart city development in Yemeni is hampered by numerous problems. These problems include the city government's slow response time to citizen complaints, its lack of transparency when administering the city, the lack of infrastructure for a successful information exchange between the community and the government, and the human resources department's lack of digital literacy. This study aims to provide a broad overview of the public service system that might be applied to the development of a Yemeni smart cities utilizing the idea of a society 5.0. The study's findings show an improved, integrated public service system that Yemeni may be able to embrace. The study's conclusions are based on issues, data analysis results, and Yemeni's requirements for requesting public services. Under the adjusted strategy, Yemeni 's urban development problems should be gradually and equally addressed, moving the country toward a smart city.

**Keywords:** society 5.0; smart city; information technology; public service system.

## Abstrak

Kota pintar dan masyarakat 5.0 adalah dua konsep yang bekerja sama dengan baik karena keduanya membutuhkan orang-orang cerdas yang telah mencapai tingkat masyarakat 5.0. serta lingkungan yang berteknologi maju. Salah satu komponen penting dalam mengembangkan kota pintar dan masyarakat Yaman 5.0 adalah memastikan pengoperasian sistem informasi yang efisien. Pengembangan kota pintar di Yaman terhambat oleh berbagai masalah. Masalah-masalah ini termasuk lambatnya waktu respons pemerintah kota terhadap keluhan warga, kurangnya transparansi dalam mengelola kota, kurangnya infrastruktur untuk pertukaran informasi yang sukses antara masyarakat dan pemerintah, dan kurangnya literasi digital departemen sumber daya manusia. Penelitian ini bertujuan untuk memberikan gambaran luas tentang sistem pelayanan publik yang mungkin dapat diterapkan pada pengembangan kota pintar Yaman dengan memanfaatkan gagasan masyarakat 5.0. Temuan penelitian ini menunjukkan sistem pelayanan publik yang lebih baik dan terintegrasi yang mungkin dapat dianut oleh orang Yaman. Kesimpulan studi didasarkan pada isu, hasil analisis data, dan persyaratan Yaman untuk meminta layanan publik. Di bawah strategi yang disesuaikan, masalah pembangunan perkotaan Yaman harus ditangani secara bertahap dan merata, menggerakkan negara menuju kota pintar.

**Kata kunci:** masyarakat 5.0; kota pintar; teknologi informasi; sistem pelayanan publik

## 1. Introduction

In this research, the notion of society is used to examine how information technology may help create a smart city. to improve Yemen's public service sector with 5.0 A smart city is one that makes use of social capital and human resources, and modern telecommunications infrastructure to enable ongoing economic growth and high standards of living, together with

prudent resource management and community involvement in governance [1]. While the idea of society 5.0 itself emphasizes integrating human and technological responsibilities so that there is a balance and there is less of a chance of the human roles degrading. The two ideas are combined into a system that is meant to promote system development in Yemen, particularly in public services.

As an archipelagic nation where the provinces are spread out, Yemeni is an appropriate illustration in this situation. There is a significant communication issue because of the geographical separation between the parties, which leads to complaints and slow access to the center. Although the information on complaints and complaints can be collected regionally, in reality, the information is often hampered in each region and results in the information not being distributed. On the other hand, some irregularities occur, such as the many practices of collusion, corruption, and nepotism. Additional issues include weak consequences, a lack of community involvement, a lack of knowledge about public services themselves, and a shortage of qualified human resources.

The existing public service system in Yemen, although it already has a sound concept, it still has to be developed and improved as technology advances. Since there are still numerous flaws and abnormalities, as evidenced by the inefficiency of data processing and excessive deviations, Yemen needs to strengthen its public service. In order to address the issues that exist in Yemen, the goal of this study is to present an overview of the public service system. It is anticipated that system development will benefit from improvement and development that also results in the digitalization of information technology to achieve a smart city while still referring to the entering society 5.0 idea in its implementation.

## 2. Method

The method used in this study is a systematic literature review. Identification, assessment, and interpretation of the body of literature are steps in the systematic literature review (SLR) technique. A way for evaluating and comprehending all of the research that is currently available a systematic literature review that is pertinent to a certain research question, subject, or phenomena of interest. With the use of a robust, stringent, and auditable approach, this technique seeks to give a fair appraisal of the study topic. The stages of the comprehensive literature review conducted for this investigation are shown in Figure 1.

|  |           |
|--|-----------|
| Formulating a Research Question                        | Planning  |
| Develop a Review Protocol                              |           |
| Relevant Literature Identification                     | Conduct   |
| Choosing Relevant Literature                           |           |
| Assessing the Quality of the Research                  |           |
| Data Extraction  |           |
| Show Synthesis Results                                 | Reporting |
| Create a systematic literature review research report. |           |

**Figure 1. Steps for a Systematic Literature Study.**

Figure 1 illustrates the set of procedures used in this study's literature review. Creating a research question and a review methodology are both parts of the first stage, which is called planning. Based on the demands of the subject, create a set of study questions. The following research queries are covered in this study:

1. Rq1. Describe an effective public service.

2. Rq2. How have information technologies affected public services?
3. Rq3. What kind of system was created to address the issues at hand?

On RQ1. The author includes further queries regarding the broad outline of an effective and efficient public service standard. Moreover, RQ2 asks for greater information on how information technology is used in public services. In this scientific article, RQ3 is used to describe a system that was created to address the issues that are now present. The next stage, known as the conducting stage, involves selecting relevant literature, identifying relevant material, evaluating the caliber of the research, extracting data, and presenting the results of the synthesis. The search method, inclusion and exclusion criteria, quality grading, data extraction, and analysis synthesis are only a few of the sections that are displayed from all the conduct stages.

### **2.1. Search Process**

The data source that we used to do a literature review in this study is a digital-based database from national and international sources, as follows:

1. Google Scholar
2. ScienceDirect
3. ResearchGate
4. International & National database.

### **2.2. Criteria for admission and exclusion**

1. To establish relevant sources, inclusion criteria are applied; in this study, sources from national and international journals published between 2011 and 2021 are included.
2. The literature that falls under the category of scientific articles/journals/books is considered for inclusion.
3. Only literature that matches the predetermined keywords and topics is included in the study.
4. Informal literature reviews without clear research goals, search strategies, or data extraction techniques are not included in the study.
5. Sources that fall outside the specified inclusion period or were published before 2011 are excluded from the study.
6. Only the most comprehensive report of the study is included in the review when there are numerous reports of the same study published in different journals.

### **2.3. Quality Rating**

Using criteria, The Systematic Literature Review approach assesses quality evaluation based on four Quality Assessment (Qa) questions.

1. Qa1. Does the source meet the mentioned requirements for inclusion and exclusion?
2. Qa2. Are the goals and objectives of the study properly described?
3. Qa3: Is the source very pertinent to the debate brought up in the study?
4. Qa4: Has the baseline data or study been appropriately explained?

Following is the evaluation process used to score the questions, which is based on the choice of three different assessments:

1. If the QA response is "yes" or "totally agree," then Y = 2.
2. P = 1 if the QA response is partially/inadequately correct.
3. N = 0 if the QA response is false or inappropriate. Table 1 provides the following quality evaluation findings.

**Table 1. lists the findings of the quality evaluation.**

| No | Author  | Title   | Journal /<br>Publisher Name        | Year | Score |
|----|---|---|------------------------------------|------|-------|
| 1. | Baoyun Zhang, Zhihan Lv, Xiaoming Li, Weixi Wang, Jinxing Hu, and Shengzhong Feng | Platform for government issues in smart cities  | Future Generation Computer Systems | 2017 | 8     |
| 2. | Andrés Camero & Enrique Alba  | Smart City and information technology: A review   | Cities                             | 2019 | 7     |
| 3. | Hsiaoping Yeh   | Successful ICT-based smart city services' consequences from the standpoint of the residents | Quarterly Government Information   | 2017 | 5     |
| 4. | Sukumar Ganapati  | Applications of Geospatial Information Systems for Public Participation                     | Public Administration Review       | 2011 | 8     |

#### 2.4. Data Extraction

The inclusion criteria being employed at this time are solely based on selected keywords. However, the exclusion criteria are based on discussions from sources unrelated to the issue at hand. After journals have been evaluated, they are extracted and categorized according to the demands for main and secondary data.

1. Original data. gathered through surveys, observations, and usage-specific gathering. Several journals from the chosen database are used to gather primary data. A review of each journal is done to collect primary data, and it is necessary to note the essential details.

#### 2.5. Data Analysis/Evidence Synthesis:

1. A service system should be efficient and focused on both satisfying the requirements and expectations of the client and delivering high-quality service. Effective management, staff development, client feedback, and the application of technology to simplify procedures and enhance service delivery may all help achieve this.
2. E-government: E-government is the application of technology to enhance the provision of public services to the public. This involves making public information and services available online and utilizing technology to increase efficiency and expedite administrative procedures.
3. Geospatial Information Systems (GIS) and Public Participation GIS (PPGIS) employ GIS technology to include the public in planning and decision-making. Geographic Information Systems (GIS) are tools for organizing and analyzing geographical data. A variety of public services, including transportation planning, environmental management, and emergency response, can be supported by the usage of GIS and PPGIS.

4. Similar ideas: Using technology to raise residents' standards of living includes ideas like public services, smart cities, and Society 5.0. Government services fall under the category of "public services," and "smart cities" employ technology to improve the delivery of these services and raise quality of life. A future civilization called "Society 5.0" will combine technology in a way that promotes both human welfare and sustainable growth.
5. Information technology in public services: Information technology is essential to achieving the goals of smart cities and Society 5.0 as well as assisting the delivery of public services. This involves the use of technology for data collection and analysis, outreach to the public, and the automation of administrative procedures. Technology integration may boost productivity, cut expenses, and raise service delivery quality.

### 3. Results and Discussion

#### 3.1. Public Services

Public services are all services, including public goods and services, that are in theory the responsibility of and are offered by government organizations at the national level, in the regions, and within State-Owned or Regional Owned Enterprises in order to satisfy the needs of the community and uphold legal and regulatory requirements[2]. Because it will deal directly with residents from all backgrounds, the public service system of the government order must be professional. Public services that are characterized by service providers' accountability and responsibility are those that are regarded as professional (government officials).

The first of the following traits, prioritizing the accomplishment of the goals and objectives, is effective. The second is straightforward and just refers to the service or method. Next, it should be structured in a simple, quick, accurate, uncomplicated manner that service seekers can easily comprehend and put into practice. Clarity and certainty (transparent) refers to the presence of both of the following:

1. Service standards and procedures.
2. The administrative and technical requirements for the services.
3. Organizational units and/or officials with the power and obligation to render services.
4. Details about service fees, rates, and payment options.
5. A timeline for the end of the service.

The fourth is transparency. In order for the public to easily learn about and understand the service process, regardless of whether it is requested, transparency necessitates that all requirements, work units, officers in charge of service providers, completion dates, time and fee details, and other issues related to it are made public. Efficiency implies the following :

1. Transparency: Whether asked or not, public service methods and information must be freely disclosed to the public for simple comprehension.
2. Efficiency: There should be no repetitive demand fulfillment and service needs should only be confined to topics directly connected to service goals.
3. Timeliness: Public services ought to be finished in a certain amount of time.
4. Responsiveness: Service providers should react rapidly to the issues, requirements, and goals of the clients they are providing services to.

5. Adaptive: The needs, wants, and ambitions of the people being served should be swiftly taken into account by public services.
6. The elements of public service standards are the following: the legal foundation, the demands, the systems and procedures, the deadline, the fees and tariffs, the services provided, the facilities and infrastructure, the implementing competencies, the internal control, the handling of inputs and complaints, the quantity of implementers, the service guarantees, the security and safety of the services, and the performance evaluation of the implementers.

### **3.2. Information Technology Involvement**

Using the idea of smart governance, which entails utilizing CS/IT to enhance democratic processes and public services like e-government, information technology is rapidly being utilized for the creation of smart cities. This can increase government system effectiveness by enabling improved planning and decision-making. The public service system, which is categorized under the governance domain, is one of the domains that smart cities may be categorized under.

E-government can reduce friction between the government and the people by bridging the gap between the two sides. Due to Yemen's archipelagic state structure, which makes inter-island communication challenging, e-government has become necessary. Nonetheless, Yemen's e-government deployment is still far from flawless.

Based on the data in Table 2, each province has its implementation phases characterized. Just six local governments have achieved the fourth stage, according to the categorization of 362 websites into a 6-stage e-government model, while 58 are still in the first stage (preparation), 221 are in the second stage (maturation), and 166 are in the third stage (utilization). The findings show that just a tiny number of Yemen's areas have advanced to the utilization stage, and even at that level, the proportion is still extremely small. This shows that Yemen is still not ready, and that e-government must be developed and improved, particularly in this circumstance and in the domain of public services.

The information in Table 2 categorizes the phases of e-government implementation in each Yemeni province. The findings indicate that while most Yemen's areas are still in the maturation and consolidation stages and others are still in the preparation stage, just a tiny number have advanced to the utilization stage. This shows that Yemen still must strengthen its e-government system significantly, especially in public services, in order to close the gap between the state and society and enhance democratic procedures and services to the people.

The municipal uses of geographic information systems (GIS) in several countries demonstrate how the municipal applications of geographic information systems (GIS) may be used in e-government organizations. A few examples of the areas where GIS technology may be applied include property management, traffic and transportation, urban planning, waste management, urban design and revitalization, and the mobilization of financial resources. Data from many sources may be combined using GIS, which also provides data visualization through maps, improves system usability, and supports decision-making processes. Moreover, GIS may increase the geographical visibility and transparency of government activities, improving the openness of public administration to the public.

At various phases of the planning process, individuals may voice their concerns about land use plans using e-government platforms based on web and GIS technologies, and those issues can be addressed. Figure 2 shows the Spatial Information System.

**Table 2. Classification of e-government development status in Yemen by province in 2018.**

| No. | Province          | Amount<br>Government<br>Utilization<br>Area | Stages      |            |               |             |
|-----|-------------------|---|-------------|------------|---------------|-------------|
|     |                   |   | Preparation | Maturation | Stabilization | Preparation |
| 1   | Abian             | 9   | 1           | 5          | 1             |             |
| 2   | Aden              | 25  | 5           | 20         | 14            | 1           |
| 3   | Al-Bayda          | 8   | 1           | 5          | 5             |             |
| 4   | Al-Hudaydah       | 15  | 4           | 7          | 8             |             |
| 5   | Al-Jawf           | 8   | 1           | 3          | 1             |             |
| 6   | Al-Mahrah         | 10  | 1           | 4          | 4             |             |
| 7   | Al-Mahwit         | 6   | 2           | 2          | 6             |             |
| 8   | Amanat Al-Asimaha | 30  | 5           | 20         | 17            | 2           |
| 9   | Amran             | 12  | 1           | 8          | 2             |             |
| 10  | Dhale             | 12  | 1           | 8          | 7             |             |
| 11  | Dhamar            | 29  | 4           | 16         | 12            |             |
| 12  | Hadramaut         | 32  | 5           | 18         | 14            |             |
| 13  | Hajjah            | 16  |             | 5          |               |             |
| 14  | Ibb               | 20  | 5           | 14         | 10            |             |
| 15  | Lahij             | 14  | 1           | 6          | 6             |             |
| 16  | Ma'rib            | 10  | 2           | 7          | 4             |             |
| 17  | Raimah            | 7   | 1           | 3          |               |             |
| 18  | Sa'dah            | 5   | 1           | 2          | 2             |             |
| 19  | Sana'a            | 36  | 6           | 22         | 18            | 2           |
| 20  | Shabuah           | 13  | 2           | 12         | 5             |             |
| 21  | Sokatra           | 20  | 4           | 15         | 9             |             |
| 22  | Taiz              | 25  | 5           | 19         | 16            | 1           |
|     |                   | 362   | 58          | 221        | 166           | 6           |



**Figure 2. GIS Illustration**

GIS technology is being used in Sana'a, Yemen, to aid in disaster management and monitoring the city's condition, including river water levels. The government has developed a

standby service 80 for direct complaint services, but there is potential to upgrade the system with digital displays for easier access to GIS data. This would align with the concept of a smart city and Society 5.0, It seeks to close the gap between society and the government via openness. There are parallels between the integration of GIS and society and Public Participation GIS (PPGIS), where citizens participate in group decision-making and collaborative mapping projects. [viii].

### 3.3. Public Service System Development

1. For each Yemeni area, a digital public service system is being planned.
2. To minimize information/complaint delays, the system links directly to the data center using a Geographical Information System (GIS) as a data and information center.
3. The system is dynamic and interactive, enabling users to get, offer, and add accurate reports or information in real-time.
4. To lessen the danger of fraud from any source, all recorded data in the system is transactional and real-time.
5. The system is anticipated to enhance and modernize Yemen's public service system and aid in the creation of smart cities.

## 4. Conclusion

Public administration in Yemen must be competent and effective. Although Yemen's idea of public services complies with the requirements, there are still issues that require fixing. Information technology must be used to address these problems, especially if smart governance is developed as part of a smart city. E-government is a notion that makes use of information technology as a tool to facilitate more effective administration of the government. The implementation of e-government in Yemen has not been entirely effective, and new concepts and systems are needed to adapt to current conditions. A digital-based public service system with the application of Smart City and Society 5.0 concepts is proposed. This system should be public, with a specific site for each region and connected directly to a data center. It should be interactive, responsive, and real-time, with transaction and recorded data. These provisions are expected to improve and upgrade the public service system in Yemen and overcome urban development problems towards a smart city gradually and evenly.

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