

A Web-Based Platform Prototype to Enhance e-Participation and e-Transparency in Local Government

Jose L. Cabrera-Guzman, Luis C. Villaverde-Hidalgo, Jorge R. Parra-Michel, Rafael Martínez-Peláez

Faculty of Information Technology

University of La Salle Bajío

León, México

e-mails: {jcg57968, lvh57920}@udelasalle.edu.mx, {jrparra, rmartinezp}@delasalle.edu.mx

Abstract— In the last years, the number of Internet users in Mexico has increased, reducing the digital divide. As a consequence, the government has developed many Web-based applications and Web-based platforms to establish close communication with the citizens based on e-government policies. The e-government policies include the topics of participation and transparency. However, the real impact of e-government policies in society is low. For that reason, we developed a Web-based platform prototype to enhance the participation of citizens and promote the transparency of government.

Keywords- *e-participation; e-transparency; open government; society; Web-based application.*

I. INTRODUCTION

The Internet has changed our world, providing the possibility to create new ways of communication and interaction with the environment. As a consequence, some group of visionaries have developed new technologies, called electronic services or e-services, to transform business, government, life, and the global economy.

The most popular e-services are e-commerce, e-banking, e-government, and e-learning due to the number of users or adopters, and their economic impact and social benefits [1]. The first reference related to the concept of e-government appeared in the seventies [2], where the government adopted information technology to perform office automation easier and faster. Twenty years later, e-government was defined by the Organisation for Economic Cooperation and Development (OECD) as “the use of information and communications technologies, and particularly the Internet, to achieve better government” [3].

According to Grönlund [4], the definition provided by the OECD makes sense from the society’s perception in terms of usability and usefulness. For that reason, it is necessary the participation of different types of stakeholders (business, civil society, private sector, and universities) to achieve a better government. In this way, a better government based on Information and Communication Technologies (ICT) must offer citizen oriented applications [5], strategic management and more accessible services.

Nevertheless, the meaning of e-government does not incorporate public participation or citizen participation in the

decision making process at any level of the government [6]. In this new perspective called e-participation [4], the concept of e-government should take into consideration an active citizenship [6] where citizens share their ideas, knowledge, and suggestions, using technology [6][7]. With citizen participation, the examination of problems should lead to policies based on real needs [8]. This means that government and citizenship need to work together for the benefit of the rest of society [6]-[8].

Although, e-participation reduces the bureaucracy and enhances communication among stakeholders, e-participation does not promote revealing data, information and processes from the government to citizens. The action where the government shares data, information, and processes to citizens is known as transparency [9]. According to Bertot et al. [10], transparency is essential to democratic participation because it offers trust in government and prevention of corruption, among other essential functions in society. In the context of e-government, transparency is called e-transparency [11]. The e-transparency contributes to the public administration reform, law enforcement and social change to reduce corruption [10].

The key contribution of this paper is the proposal of a new Web-based platform to improve e-participation and e-transparency to promote more collaboration among citizens. The structure of the paper is as follows. In Section II, we present the main concepts related to the contribution. In Section III, we describe the method used to develop our proposal. In Section IV, we describe the key components of our proposal. Finally, in Section V, we give our conclusions and future work.

II. LITERATURE REVIEW

In this section, we briefly explain the keynote concepts which are necessary to know the context of the proposal.

A. World Wide Web

One of the key components in the creation of e-services is the World Wide Web (WWW) created by Tim Burners-Lee in 1989 [12]. The first stage of the WWW is known as reading-only or Web 1.0, and it is based on global hypertext space, static HyperText Markup Language (HTML), client-server architecture, and Web forms. Web 2.0, defined by

Dale Dougherty, appeared in 2004 [12]. The second stage of the WWW is based on Extensible Markup Language (XML), Really Simple Syndication (RSS), peer-to-peer architecture, and Web applications, known as reading-writing or Web 2.0 [12].

The main differences between Web 1.0 and Web 2.0 are the flexibility of Web design, creative reuse, and collaborative content creation. In other words, Web 2.0 provides the possibility of an interactive collaboration among different people where they share experience, knowledge, and lessons learned [12]. The most relevant technologies created in this stage are blogs and social network sites by means of users working together to share data, resolving challenges and changing the world [13].

B. Web-based Platform

A Web-based application is a system with application components on the client-side which communicates with application components in a Web server for data processing based on the client-server architecture [14]. The data processing is carried out by the server because it has more resources than clients. Then, a Web-based platform is a Web-site, which provides two or more Web-based applications using different technologies [15]. In the context of e-government, a Web-based platform must fulfil the following requirements [15]:

- Interoperability – The Web-based platform must be accessible by any type of device using any type of communication based on international standards.
- Flexibility – The Web-based platform must be accessible by any citizen from anywhere and anytime.
- Inclusively – The Web-based platform must be accessible by any citizen with or without physical limitations.
- Scalability – The Web-based platform must have enough processing and storage capacity to process each request from citizens.
- Security – The Web-based platform must be based on security standards to provide authentication, confidentiality, integrity, and non-reputation in each transaction between the government and citizens.

C. Social Network Sites

A Social Network Site (SNS) is a Web-based service that allows individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system [16]. For those reasons, SNS have been rapidly accepted by Internet users due to the possibility to keep in touch with family, friends and others [16]. In this scenario, Internet users have the option to share ideas, comments, and feelings with others, without barriers of time and space. Moreover, the messages published in SNS travel through the cyberspace faster than traditional media [17].

In the context of e-government, SNS allows different citizens to collaborate from any location via a virtual

community to exchange information, knowledge, problems, and solutions without space and time limitations [13].

D. Corruption in Mexico

Transparency International publishes every year the corruption perceptions index. In the 2018 index, Mexico appears in the 138th position among 180 countries with 28 points out of 100 possible points [18]. In January 2019, Pring and Vrushi published the report “Tackling the crisis of democracy, promoting rule of law and fighting corruption” where they propose the following actions to reduce corruption and consolidate democracy: a) provide democratic checks and balances, b) bridge the gap between laws and their implementation, c) support public accountability, and d) press freedom [19].

More recently, Pring and Vrushi reported the citizens’ perceptions about corruption in Latin America & the Caribbean, where they found that people think that corruption increased in the previous 12 months. In the particular case of Mexico, 45% of the people think that corruption has increased, and 90% of the people believe that corruption in government is a big problem [20].

E. Transparency

Transparency is not a new idea; it appeared around the 70s creating new laws and rules to share governmental information with citizens. As a consequence, citizens can get access to documents from government and non-governmental organizations [21]. Nowadays, the concept of transparency is linked to the concept of accountability to provide legitimate reasons for the way the public sector spends the budgets [22].

The information can be accessed in different ways, including a Web-based platform [9]. For that reason, local governments can take advantage of a Web-based platform to make available information and accountability without a specific request.

F. Participation in Public Administration

Participation in the context of public administration is known as collaborative governance, where citizens take part in the strategic decisions as well as promote accountability and responsiveness for the benefit of society. In this vision, citizens are partners of the government to enhance democracy and efficient governance [22].

Governments adopt new technologies to establish communication and interaction with citizens. The e-participation broadens the possibility for more citizens to be heard and to collaborate with the government [22].

G. Open Government

Open government is the consequence of transparency, accountability, and participation activities. In this new tendency, the public administration reveals documents using a public repository [23]. This action seems to be unidirectional; however, technology gives the possibility to create a bidirectional channel between government and citizens, creating a knowledge society.

The open government promotes the following activities related to democracy: monitor government, create policies and collaborate in developing new government services [24]. However, open government could be adopted by the following factors [25]: a) cause is the action to improve legitimacy and efficiency, b) constituents is the response to society caused by conflicting interests, c) content is the reaction to provide information as soon as possible, d) control is the conviction to share information, and e) context is related with the conditions of the environment.

III. METHOD

A. Problem Definition

According to the reports presented by Transparency International in 2018 and 2019 [18]-[20], Mexico has several problems of corruption which impacts all levels of society, from the top to the bottom, affecting the quality of life of more than one hundred millions Mexicans in terms of education, health, inequality, poverty, social welfare, civil and political rights.

Although the purposes of e-government, e-participation, e-democracy, e-transparency, and open government sound good, being useful in other countries, these do not work correctly in Mexico. Mexico has adopted, integrated, and transformed many processes and services to e-government [26][27], in the last nineteen years, as well as created and applied an open data policy since 2012, without reducing corruption. Moreover, many of the Web-based applications and Web-based platforms created by the Federal Government and Local Governments do not incorporate elements to establish real communication between authorities and people, leaving aside the participation of citizens.

B. Solution

In the State of Guanajuato, we can find some Web-based applications, Web-based platforms and Mobile-applications to connect citizens with the government; however, the previous solutions have the following limitations:

- Low incorporation of citizens in the definition of state strategic planning development, making it more inclusive.
- Low participation of citizens in strategic management to resolve problems.
- Poor or null notification of investment in public works and infrastructure as a policy to inform about the progress and total cost.

As a consequence, the government makes decisions based on a limited vision, and, sometimes, the government does not know the real necessities of citizens, carrying out an inefficiency distribution of resources and distrust in government.

For those reasons, we developed a Web-based platform where any citizen has the option to publish a complaint, idea, requirement, and solution related to the city of Leon Guanajuato, driving collaborative decision-making and promoting transparency.

C. Considerations

In recent years, information and communication technologies have changed the way people connect with people, companies interact with customers, and governments interact with citizens. Under these circumstances, it is common to request something, in both directions, to resolve a problem, to create a new service, to validate an idea, or to support an initiative that creates added value to society.

Our perception is based on the service delivery lifecycle [23][28]. In the first stage, the government consults citizens about public services and urban planning to define the state development plan. The purpose of this stage is to collect data from different points of view.

In the second stage, the government executes the activities providing services and resolving problems with the active participation of citizens. In this stage, public administration interacts with universities, non-governmental organizations, and the private sector to collect the knowledge from a different perspective, searching the best solution.

In the third stage, citizens can monitor the activities day-to-day, creating a culture of transparency and accountability in each action.

As a consequence, a technological solution needs to include each stage to bring added value for public services based on collaborative decisions and knowledge society.

IV. PROTOTYPE

In this section, we describe the main components and key functions of our proposal. The proposal is inspired by the first citizen-driven system for local public service called FixMyStreet.com [29].

We decided to develop a responsive Web-based platform because it is accessible by mobile devices and computers (or laptops) from anywhere and anytime. The prototype was developed using .NET and ASP.NET core frameworks, and MySQL as a DataBase Management System.

A. Entities

The Web-based platform has the following entities:

- Citizen – any person who lives in a city and has a proposal for the local government.
- Web-based platform – system managed for the government to enhance interaction with citizens for collecting relevant data.
- Responsible – is a member of the local government.
- System administrator – verifies the correct functionality of the Web-based platform, updates or deletes proposals, and performs the maintenance of the system.

B. Database

The database contains nine tables that start with tbl, as a rule (see Figure 1). The tblProblema table maintains the records related to the proposal, such as ID_Problem (PK), title, description, ID_status (FK), ID_Responsable (FK), and email. This table is the core of the proposal because it connects the other tables.

The table which contains the location of the problem is tblDireccion and it contains the following columns: ID Problem (FK), street, number, district, and reference. This information is useful to identify the situation; however, it could be possible to identify it using a geolocation API. In the tblFoto table, the evidence of the problem is stored in image format. In this particular case, the evidence is used to provide a better explanation for any citizen and responsible.

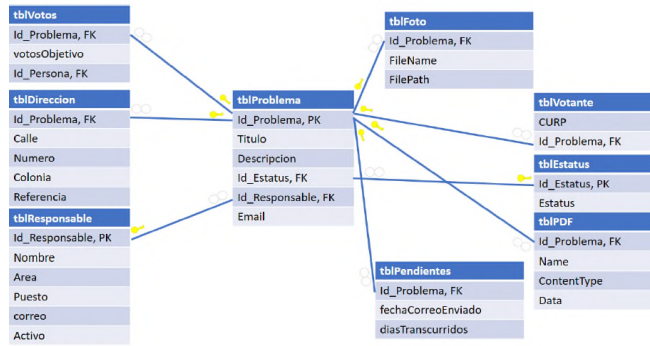


Figure 1. Design of the database.

The information related to each citizen is stored in tblVotante table. In this case, the citizen submits her/his Unique Population Registry Code or Personal ID code to the Web-based platform. When the Web-based platform receives the Personal ID code, it verifies its validity. This data is required every time the citizen wants to vote for any complaint, idea, requirement, and solution.

C. Generate a Proposal

The Front-end of the Web-based platform has a menu in the top right corner. The menu presents the option to create a report (see Figure 2).



Figure 2. Front-end of the Web-based platform.

After clicking the option to create a report, the Web form appears (see Figure 3). The citizen fills in the Web form with the following information: title, description, location, evidence, the area related to the report, and her/his email.

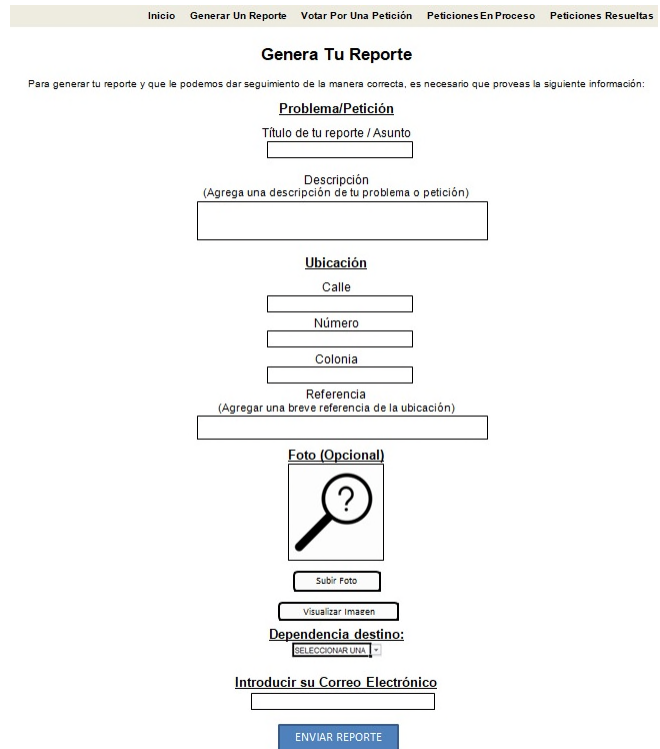


Figure 3. Web form to create a report.

Then, the system administrator verifies the information provided by the citizen. If the information is incorrect, the system administrator sends an email to the citizen explaining the mistake and giving him/her the possibility to update the information. If the information is correct, the system administrator accepts and publishes the report. As a particular case, if the system administrator identifies double reports, the duplicates are deleted.

D. Voting for a Request

When a citizen wants to see the list of reports, she/he needs to click on the options vote for a request located on the menu. As a response, the Web-based platform shows the entire request list, as shown in Figure 4.



Figure 4. Example of the list of citizen's request.

If a citizen wants to know more about a specific report, they need to click on the "see" button. The citizen can read

the information without changing or modifying anything, keeping the integrity of the record. If the citizen wants to give his/her vote to this report, the Web-based platform requires the citizen's Unique Population Registry Code or Personal ID code. Finally, the citizen clicks the vote button to submit the vote to the Web-based platform. The Personal ID code is used to prevent double votes from a citizen, providing trust and legitimacy to citizens.

E. Request in Progress

Once the local government team receives a request from the Web-based platform, they need to resolve the problem as soon as possible because the Web-based platform counts the days that have passed since the report was created. As a result, citizens know the efficiency of local government action. Figure 5 shows the number of days, or the elapsed time, since the record was created.

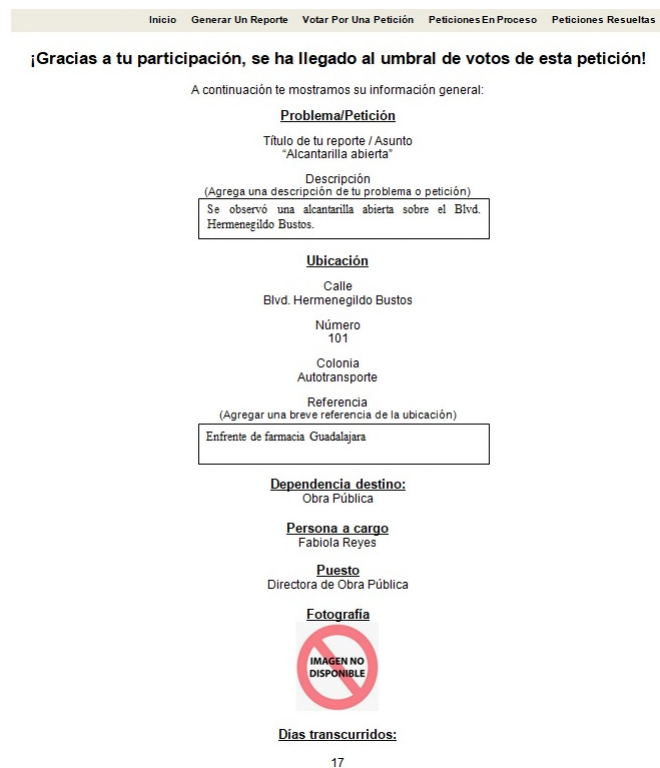


Figure 5. Example of the elapsed time in days.

In this way, the local government team can focus their effort on solving real problems that affect many citizens and avoiding the waste of time caused by the misassignments of tasks.

F. Request Made

After the local government team finalizes the request, they need to publish the final status and the following files: a) images related to the solution and b) PDF document with the financial information (see Figure 6). The evidence is public, promoting transparency and accountability as a social culture.

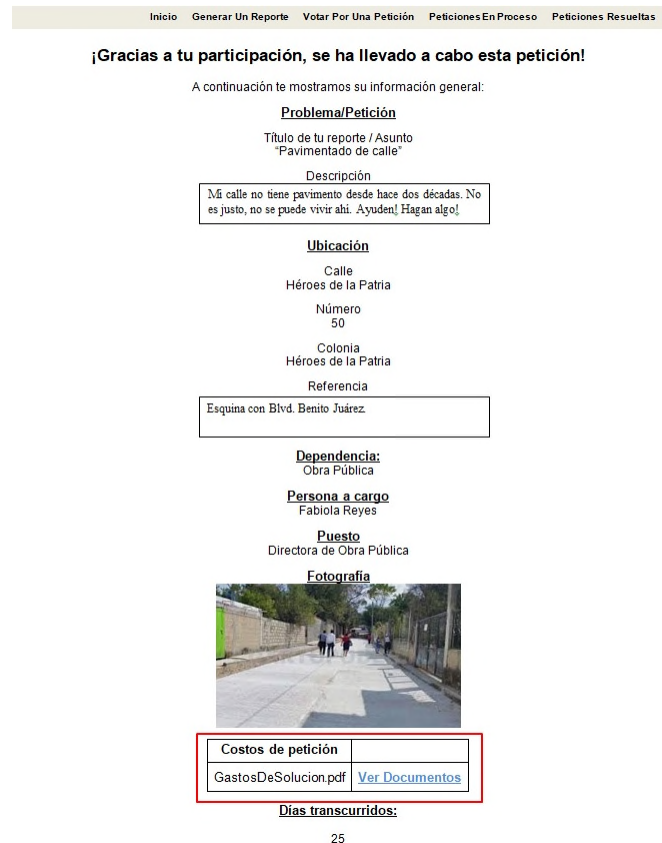


Figure 6. Example of transparency and accountability.

This process promotes the active participation of public administration in transparency and accountability, encouraging the transformation towards an open government. The information can be accessed and consulted by any citizen from anywhere, promoting constant monitoring in the government's work.

V. CONCLUSION

In a country where corruption is part of everyday life, it is clear that public administration requires increasing legitimization, efficiency, accountability, and transparency in collaboration with citizens to define an inclusive state development plan based on real requirements instead of unnecessary or excessive expenses when the budget is limited. One of the communication channels to collect data, interact with citizens, evaluate results, and receive feedback is a Web-based platform because it is a cheaper option than traditional options. Moreover, the Web system promotes bidirectional communication at any time. Also, the public administration can publish different types of files as evidence, giving more information to citizens. In this way, citizens have more elements to know how the public administration spends the budget and which are the entities receiving federal contracts.

We have presented the prototype of a Web-based platform whose purpose is promoting the collaboration between citizens and local government to resolve real problems for the benefit of society. The prototype requires

active participation from citizens to define the priority to meet a request and to monitor the spending of time and budget. We are evaluating the prototype among citizens in the city of Leon Guanajuato, Mexico, in terms of usability and perception.

ACKNOWLEDGMENT

This work was partially supported by the University of La Salle Bajío in Leon, Mexico.

REFERENCES

- [1] L. Révészová, J. Bucko, and P. Mihók, "Modelling of e-services," in *Ambient Intelligence Perspective*, vol. 1, IOS Press, pp. 203-2010, 2009.
- [2] A. Grönlund and T. A. Horan, "Introducing e-gov: history, definitions, and issues," *Communications of the Association for Information Systems*, vol. 15, pp. 713-729, 2004.
- [3] OECD, "Implementing e-government in OECD countries: experiences and challenges," OECD, pp. 1-9, 2008.
- [4] A. Grönlund, "Ten years of e-government: the 'end of history' and new beginning," *Electronic government 2010. Lecture Notes in Computer*, vol. 6228, Springer, Berlin, pp. 13-24, 2010.
- [5] I. Ivan, B. Vintila, C. Ciurea, and M. Doinea, "The modern development cycle of citizen oriented applications", *Studies in Informatics and Control*, vol. 18, no. 3, pp. 263-270, 2009.
- [6] M. Joao Simoe, "Sociological reflections on e-government," *The Sixth International Conference on Digital Society, IARIA*, pp. 29-34, 2012.
- [7] S. Kim and J. Lee, "E-participation, transparency, and trust in local government," *Public Administration Review*, vol. 72, no. 6, pp. 819-828, 2012.
- [8] R. A. Irvin and J. Stansbury, "Citizen participation in decision making: is it worth the effort?," *Public Administration Review*, vol. 64, no. 1, pp. 55-65, 2004.
- [9] E. W. Welch and C. C. Hinnant, "Internet use, transparency, and interactivity effects on trust in government," *36th Annual Hawaii International Conference on System Sciences*, pp. 1-7, 2003.
- [10] J. C. Bertot, P. T. Jaeger, and J. M. Grimes, "Using ICTs to create a culture of transparency: e-government and social media as openness and anti-corruption tools for societies," *Government Information Quarterly*, vol. 27, no. 3, pp. 264-271, 2010.
- [11] F. Bannister and R. Connolly, "The trouble with transparency: a critical review of openness in e-government," *Policy & Internet*, vol. 3, no. 1, pp. 1-30, 2011.
- [12] S. Aghaei, M. Ali Nematbakhsh, and H. Khosravi Farsani, "Evolution of the world wide Web: from web 1.0 to web 4.0", *International Journal of Web & Semantic Technology*, vol. 3, no. 1, pp. 1-10, 2012.
- [13] S. Ae Chun, S. Shulman, R. Sandoval, and E. Hovy, "Government 2.0: making connections between citizens, data and government", *Information Polity*, vol. 15, pp. 1-9, 2010.
- [14] N.R. Dissanayake and G.K.A. Dias, "Web-based applications: extending the general perspective of the service of web," *The 10th International Research Conference of KDU on Changing Dynamics in the Global Environment: challenges and opportunities*, 2017.
- [15] A. Kaliontzoglou, P. Sklavos, T. Karantjias, and D. Polemi, "A secure e-government platform architecture for small to medium sized public organizations," *Electronic Commerce Research and Applications*, vol 4, no. 2, pp. 174-186, 2005.
- [16] D. M. Boyd and N. B. Ellison, "Social network sites: definition, history, and scholarship," *Journal of Computer-Mediated Communication*, vol. 13, no. 1, pp. 210-230, 2007.
- [17] P. Romero-Navarro, R. Martínez-Peláez, D. Toto-Jiménez, M. H. Juárez-Pérez, and C. A. Ochoa-Ortiz, "Knowing the tendency of an electoral candidate through facebook: a case study in municipal election in Miahuatlán de Porfirio Díaz, Oaxaca," *Programación Matemática y Software*, vol. 8, no. 2, pp. 8-16, 2016.
- [18] Transparency International, "Corruption perceptions index 2018," *Transparency International*, pp. 1-26, 2018.
- [19] C. Pring and J. Vrushi, "Tackling the crisis of democracy, promoting rule of law and fighting corruption," *Transparency International*, 2019.
- [20] C. Pring and J. Vrushi, "Global corruption barometer: Latin America & The Caribbean 2019," *Transparency International*, ISBN: 978-3-96076-126-6, 2019.
- [21] C. Ball, "What is Transparency?," *Public Integrity*, vol 11, no. 4, pp. 293-308, 2009.
- [22] K. Soonhee and L. Jooho, "E-Participation, transparency, and trust in local government," *Public Administration Review*, vol. 72, no. 6, pp. 819-828, 2012.
- [23] L. Schmidhuber, D. Hilgers, T. Gegenhuber, and S. Etzelstorfer, "The emergence of local open government: Determinants of citizen participation in online service reporting," *Government Information Quarterly*, vol. 34, no. 3, pp. 457-469, 2017.
- [24] M. Gascó-Hernández, E. G. Martín, L. Reggi, S. Pyo, and L F Luna-Reyes, "Promoting the use of open government data: Cases of training and engagement," *Government Information Quarterly*, vol 35, no. 2, pp. 233-242, 2018.
- [25] E. Ruijter, F. Détienne, M. Baker, J. Groff, and A. J. Meijer, "The politics of open government data: understanding organizational responses to pressure for more transparency," *American Review of Public Administration*. [Online]. Available from: <https://journals.sagepub.com/doi/full/10.1177/0275074019888065>
- [26] OECD, "Digital government in Mexico – The path towards a sustainable and inclusive digital transformation," OECD, pp. 1-5, 2018.
- [27] UN, "E-government survey 2018 – Gearing e-government to support transformation towards sustainable and resilient societies," *United Nations*, pp. 1-300, 2018.
- [28] D. Linders, "From e-government to we-government: defining a typology for citizen coproduction in the age of social media," *Government Information Quarterly*, vol. 29, no. 4, pp. 446-454, 2012.
- [29] S. F. King and P. Brown, "Fix my street or else: using the internet to voice local public service concerns," *The First International Conference on Theory and Practice of Electronic Governance (ICEGOV 2007)*, Dec 2007, pp. 72-80, ISBN: 978-1-59593-822-0.