

Explaining the Role of National Participant Geospatial Information System in the Effectiveness of Urban Services with a New Approach

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ABSTRACT

This article is written with a new approach of an integrated system, under the title of National Participatory Geographical Information System, which is introduced. This approach originated from people's thoughts in dealing with national and transnational issues and issues in the form of participation, which has challenged human evaluations and needs to educate everyone. Now, researchers, stakeholders, and government officials' primary concern are finding ways to increase public participation in these programs. Especially digital cities have been made available in line with all the angles of virtual planning. In the coming years, how to deal with technology in the framework of a coordinated information system dependent on space-time-place is very important. After platform creation, it must be managed and can be used and developed within the requirements management framework. A case study was chosen to prove the applicability of this study. The problem of the wrong cycle is a general process with the aim of its educational structural correction

INTRODUCTION

Living without a desk might be challenging but managing a world without time seems disastrous. The idea that time does not exist is inconceivable to many: time must exist. Almost every experience tells us this (Baron et al., 2022). Time plays a crucial role in the Doctoral Dissertation from which this article is extracted, which is the basis for writing the thesis by the researcher. Therefore, the researcher thinks about time differently than anyone who has written a text on this topic. Decision-making and decision-making with public participation are essential components in all processes. Also, this component in the conditions of synchronizing with the occurrence of events and being aware of projects from the beginning to the end is the basis for compiling and writing this article, is placed. Today, essential, and complex decisions are mandatory for every

community, local government, or municipality in cities' comprehensive planning and development. In this regard, it should be said that making optimal decisions by integrating and combining a set of emerging phenomena such as geographic information systems or GIS, which itself is a result of participation, has played a significant role in the flourishing of knowledge and information (Johnson et al., 2022; Valánszki et al., 2022).

In recent decades, urbanization, sustainable development, and information and communication technology revolution," as the most important global trends, have played the most significant role in the life of human societies (Bibri, 2018). As a result of the urbanization of communities, Today, more than half of the World's Population (54%) lives in cities, and it is expected that this ratio will reach more than two-thirds (66%) by 2050 (United Nations, 2015;

United Nations, 2019). Historically, the city and the modernization of societies are directly linked together. Modernity (modernity or newness) the systematic process of social production of wealth and risks and considers modern societies risky (Beck, 1992). It can be said that the movement of cities towards sustainable development, as well as the increasing role of information and communication technology in decision-making and decisions related to urban management, has transformed the city administration system. If this discourse emphasized environmental, social, and economic sustainability in the 1980s, in the 1990s, it highlighted the concept of a smart city, but Today it has focused on "sustainable smart cities" (Bibri, 2018).

Open-source urban governance is a new way to attract citizen participation consisting of electronic participation, remote democracy, information technology democracy, electronic consultation, web-based citizenship, online public administration, and others (Silva, 2013). A central part of urban activities is focused on collaborative development for planning, designing, and implementing urban services based on electronic infrastructure, E-services which result in service changes as well as socio-technological changes and are associated with changing forms of participation (Wessels, 2010). Most of these disciplines are related to the geographic information system and the requirements of the expertise of using data and spatial information, which are important topics such as requirements management, usability, context and infrastructure-oriented models, decision-making processes with variables. different, participating in the exchange of information, discussions related to time-space and vice versa, creating discussion and inquiry forums, the occurrence of simultaneous events, real-time events, planning and cooperation in software design with the approach of participation at advanced levels at the local level and include the national The final

result of the discussed rules is the effectiveness of activities and services in the field of management and efficient cooperation in Urban planning. In recent years, the role of participatory geographic information systems in urban planning has become very prominent in various economic, health, environmental, psychological, social, and even security and industry aspects (McCall, 2019).

People's participation in information production has been carried out in the framework of geo web, collaborative geographic information system, voluntary geographic information, spatial crowdsourcing, user-oriented spatial content production, new geography, location-oriented citizen science, and coordinated collective intelligence with computer support. As a result, it can be said that the continuation of this process can provide a kind of participation-oriented electronic governance, also called urban open-text governance (Silva, 2013). (Indrajit et al., 2019) evaluated the type and quality of participatory spatial information that can be used to support planning based on a participatory geographic information system in a city of a developing country using the criteria of the country's development plan and its specialization. Collaborative spatial data in this study is applied in the form of location values and user preferences in the city, which utilizes experts and strangers to this collaborative system by creating a decision support system. This support in Today's world should be based on the wisdom of ordinary people and properties that play an essential role in good governance. In other words, according to the issues, the prerequisites for achieving sustainable development in any country will be the optimal participation of an entire society, which must be adequate, transparent, responsive, effective, and efficient.

Finally, regarding the collaborative geographic information system, it should be said that some authors use the abbreviation PPGIS in their studies and others use PGIS.

Still, some researchers use these two terms together instead of each other in different parts of a study, while some differences between these two are in nature. In confirmation of this issue, a study was conducted under the title of political rethinking after GIS or PGIS, which completely changed the nature of the discussion. Therefore, whether PGIS is correct or PPGIS wastes time and deals with a completely marginal matter. We move away from the goal and make a system with this historical identity created to support the marginalized strata ineffective. (Radil & Anderson, 2019; Dunn, 2007) according to the researcher's opinion in this article, Today, there is no such thing as GIS-based collaboration that can be separated from each other. For this reason, the foundation of NPGIS has been introduced, consisting of environment, systems, and time.

RESEARCH METHODS

The research models discussed are stated in parallel with the present study. Its content can be developed using open-source programming languages such as JavaScript and Java applications. The map component for open-source maps, such as map tool libraries, relies on Java under the open-source API. You can use the optimized, up-to-date, and powerful Python software specific to Arc GIS software that is widely used even in very new and advanced technologies such as Blockchain. Blockchain means that blockchains can be used privately and for specific purposes in an institution or organization, also called organizational Blockchain. So, with this definition, its main goal, which was to decentralize and separate from the traditional banking system, will go away. Blockchain was created in 2008 based on the ideas of an unknown person for the first time with the creation of a computer currency called Bitcoin, which is now considered the leader of digital currencies which can be used to store information. related to the property of the users. It should also be briefly said about Bitcoin that it was the first digital

currency that started the decentralization process in the post-Internet world, which is always considered the beginning of the art of planning in the digital world (Abbruzzese, 2021; Zarrin et al., 2021; Trček, 2022).

This decentralized system is a database that is maintained and updated by network participants based on the understanding mechanism and data architecture, and it is, in a way, the same cooperative system that currently, a few cluster companies have the monopoly of setting up the Internet and providing have taken the services related to it. This type of Internet relies on blockchain technology and artificial intelligence, so with the benefit of these technologies, the Internet, as it was said, will be freed from the monopoly of a few large companies in this field and will be available to ordinary people. There is no doubt that this idea can be very fruitful and will be one of the most important features of utopias (Roose, 2021; Miller, 2021). What distinguishes Web 3 from previous versions of the Internet is its decentralization; Of course, this version of the Internet is considered interactive like Web 2.0. Web 3.0 is considered a decentralized version of Web 1.0 and Web 2.0. And it seems that Web3 has a very complex structure and potential for development (Hosch, 2021; Livni, 2021; Zarrin et al., 2021).

In the next section, considering the newness of the participation-oriented spatial information system, the context and mechanisms of this system are explained in the case of Sari city, the capital of Mazandaran province, which has this potential. It is certain that in this presentation process, the capacity of the participation-oriented spatial system, pathology of the existing structure, process, and function of the 137 system, and people's capacities to establish a new system are considered. Finally, it seems that the possibility of creativity and innovation is available in these fields. Sari is one of the most populated cities in the north and the former capital of Iran (before Tehran), the

capital of Mazandaran province and Sari city. Sari is also one of the oldest historical cities in Iran, more than 6000 thousand years old, and is located at the coordinates of 36°33'48" north latitude and 53°03'36" east longitude and whose Population is 347/402 people (Urban Sari, 2018; Statistical Yearbook of Iran, 2018). Figure (1) shows the location of Sari city in the country and Mazandaran province and Iran. Because various methods to solve participation-oriented issues require collective evaluation and decision-making. Therefore, the mind of each person is very different from the mind of another person, so choosing a method is very challenging because this study challenged the mind of people along with considering all the influencing factors and reviewing solutions.

The primary challenge of this study has been precise in that the minds are big and come out of passive behavior and help to change the transpersonal identity along with the experiences to participate at a high level. This can lead to the improvement of the identity and structure of people in a society, the shape of cities, and almost everything. It brings with it that it can be considered a positive thing. Conducting localization studies based on the type of applied method and the characteristics of the localization target includes different steps (Fallah et al., 2014). In general, usability in any planning process directly refers to two points: first, accessibility, and second, reliability. It means planned projects and unplanned projects. In scheduled projects, it can be scheduled time in routine activities or other scheduled operational activities, such as resizing projects, which means that equipment is not available (Jakob, 1993; Mattingly et al., 2015; Amelia & Prananto, 2015; Saleh et al., 2015; Rodríguez et al., 2015), stoppages in unplanned projects are most likely due to unwanted incidents. They can also be due to unplanned interruptions in work. The Downtime caused by equipment failure is related to both the reliability of the equipment or the number of equipment

failures and the time required to restore the equipment. Using the above explanations, the accessibility formula equals the relation one.

$$\text{Availability} = (\text{Calendar Time} - (\text{Scheduled Downtime} + \text{Unscheduled Downtime}) / \text{Calendar Time} * 100 \dots \dots \dots (1)$$

Suppose we assume that all the events that co-occurred are unplanned due to failure events in the project equipment. So, unexpected events are related to reliability through the relationship between the two.

$$\text{Unscheduled Downtime} = \text{MTTR} \times (\text{Calendar Time} - \text{Downtime}) / \text{MTBF} \dots (2)$$

An example of the start of creating the software for logging in is shown in figure (2). The e-government model is shown in figure (3). The model of 137 municipalities in Figure (4) was chosen as a decision-making process, which can be seen in Figure (5). The abstract of the criteria and topics of the study is shown in Table (1). In the next part, the municipal opinions of the experts are ranked as follows. 1) General satisfaction 2) Dissatisfaction 3) Lack of communication 4) Unsuccessful call 5) Repeated and informed. Also, the following criteria: 1) survey 2) referral to the cartable 3) field visit 4) speed 5) quality 6) general satisfaction 7) confirmation of performance 8) disapproval of performance 9) referral to the executive director's cartable with the purpose of feedback to the municipality's court The level of public satisfaction should be measured by the process of network analysis. Super decision software and the ANP method were used to analyze this part, and the final weight of this model is given in Figures (6) and (7). Internal relationships are also shown based on the form of the question. After drawing the model in the software, pairwise comparisons are made, which are given below.

RESULTS AND DISCUSSION

This part of the survey shows that the citizens' satisfaction with telephone answering is in a good rank. Still, the municipality's follow-up, performance, and satisfaction levels are almost or, to a great extent, low. It should be noted that the time and timely response factor plays a decisive role. Now it's time to reach these answers observed during the study. The priority or the main concerns of the stakeholders in this section are also addressed by using the ANP process to prioritize the following five criteria:

1. Communication channels
2. Cost
3. Misuse and failure to protect data privacy
4. Lack of support for quick and timely decision making
5. Project information management

First, the network model of the research is drawn using Super design software, and its final weight diagram with ANP is shown in Figure (8). The lack of support for quick and timely decision-making has won the first rank with a weight of 0.242. Misuse and failure to protect data privacy, with a weight of 0.232, ranked second, and cost ranked third, with a weight of 0.202. Figure (9) shows the final importance of these economic and social criteria. The frequency of responses indicates an easy-to-use interface, even with a small number of participants. That is, even the work in the hands of those who do not have the experience of mass planning in route finding will be able to create a new network of routes with reliability and no doubt. Therefore, in addition to effective decision-making, the paths created in a place will be clear and realistic (Denwood et al., 2022). Statistical analysis was performed on user performance data collected from pre-post web activity questionnaires and analytical software. Finally, all data were submitted to the Statistical Package for Social Sciences (SPSS) for statistical analysis, the results of which are discussed. The following are the activities of statistical

authorities that have been used in the study and have made efforts in this way (Tabatabai et al., 2022; Choi et al., 2021).

In the fifth part, according to the issues and limitations of the study, the number of accompanying people, apart from the general interview, which was 384 samples and based on the Population of Sari, varies between 19 and 70 people. So, we arrive at the statistical ranking according to what the municipality has considered being considered by the people; based on the Friedman test, the following results have been obtained. After the descriptions and based on the general question, it was done according to the Population of Sari, shown in the following. Since Milton Friedman examined it for the first time in 1937, the non-parametric statistical test is known by his name. This test does not need to see the distribution of variable values (Friedman et al., 2010). The calculation of Friedman's statistic, which is represented by χ_r^2 , is possible using the following relations and can be done in two ways:

$$\chi_r^2 = \frac{SS_{br}}{k(k+1)} \dots\dots\dots (1)$$

where SSbr is the sum of the rank squares between the distributions and k is the number of categories or distributions for which the ranking is done.

$$\chi_r^2 = \frac{12}{Nk(k+1)} \sum (T_g)^2 - rN(k+1) \dots\dots\dots (2)$$

Where N is the number of subjects, k is the number of categories or distributions for which ranking is done, and T_g is the sum of the ranks of the g-the group. The value of SS_br is also obtained from the following relation.

$$SS_{br} = \frac{\sum (T_g)^2}{N} - \frac{(T_{all})^2}{N_a} \dots\dots\dots (3)$$

This test was used to check whether the criteria of satisfaction with time participation are significantly different from each other or not. The results of this test showed that the proposed factors have a significant difference at the 99% confidence level. The comparison of the average ratings showed that the time with an average of 5.97 is in first place. The activity on time is

in second place with an average of 5.90, and the Along option, which is the same as the mobile smartphone, and the result of the first and second options with a score of 5.97, is in third place. Other factors were ranked next. Its diagram is shown in figure (10), and the software output can be seen below it.

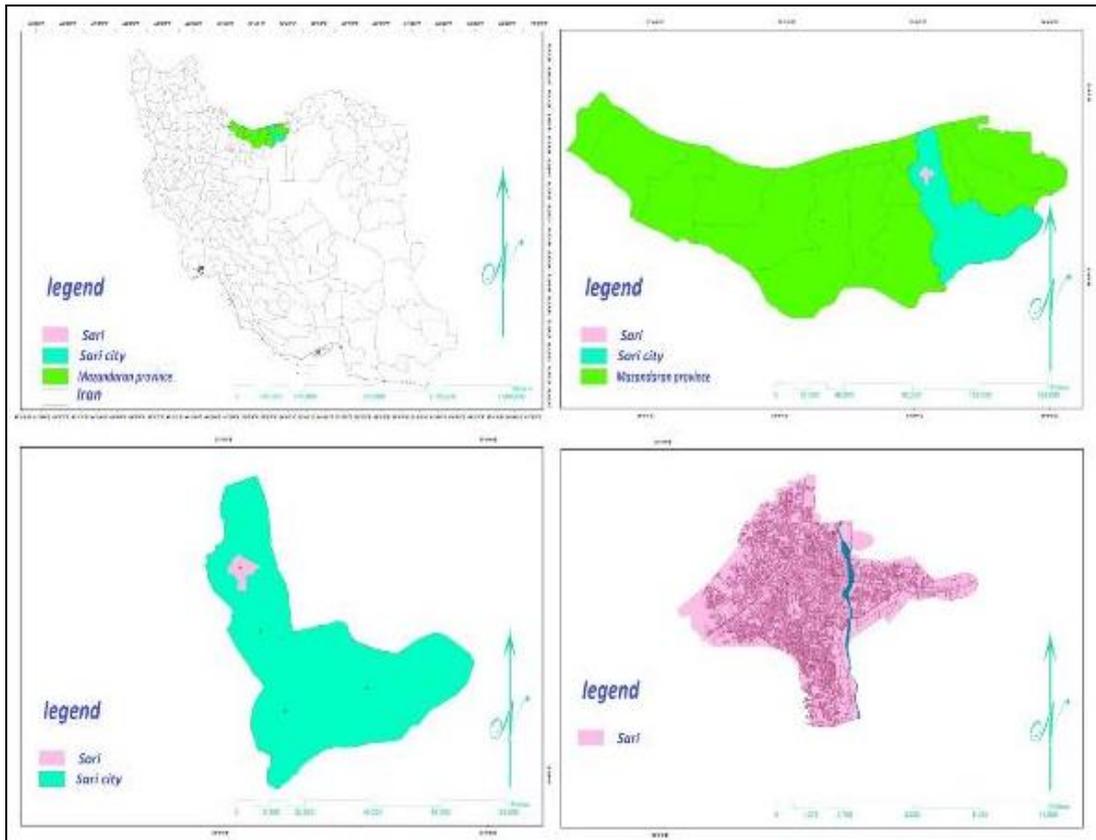


Figure 1. The picture of the location of Sari Town, in the country of Iran, Mazandaran Province and Sari City

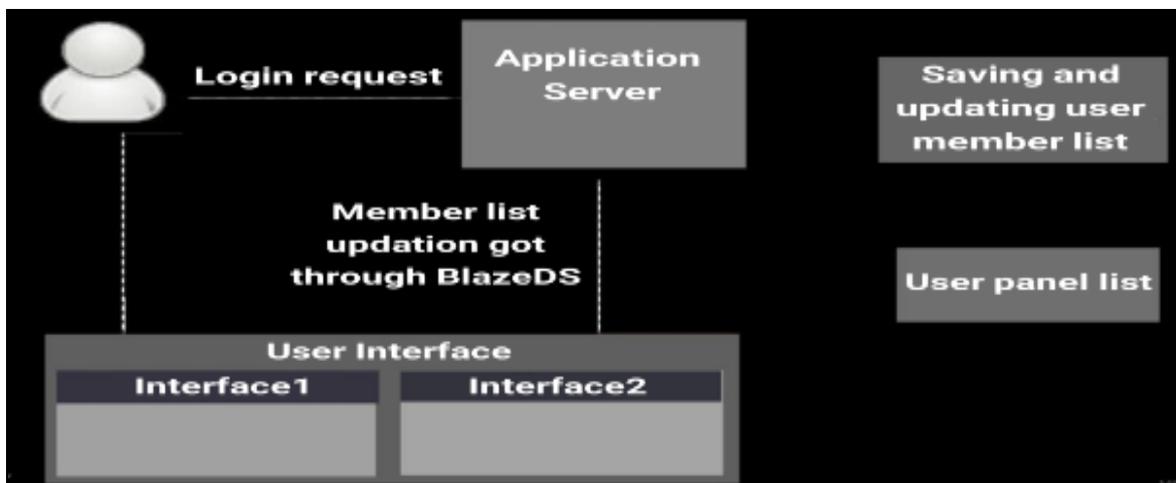


Figure 2. Is an example of software programming to Request Entry into the System

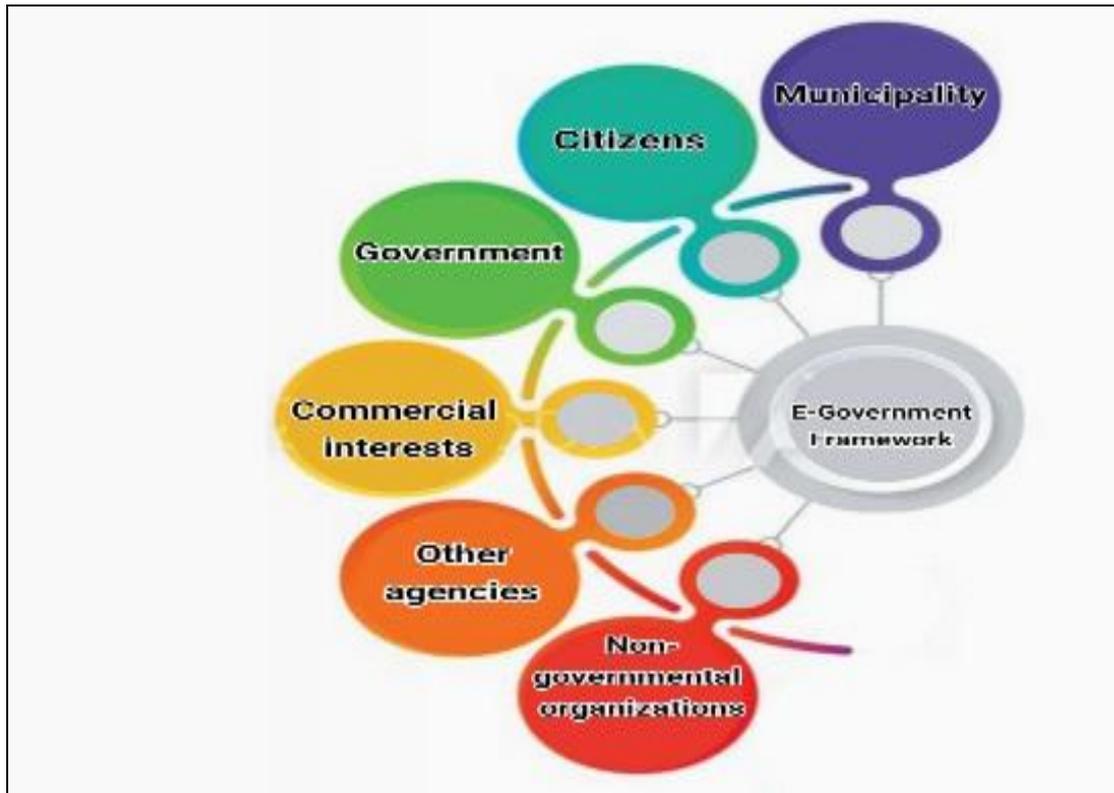


Figure 3. Concept of electronic government

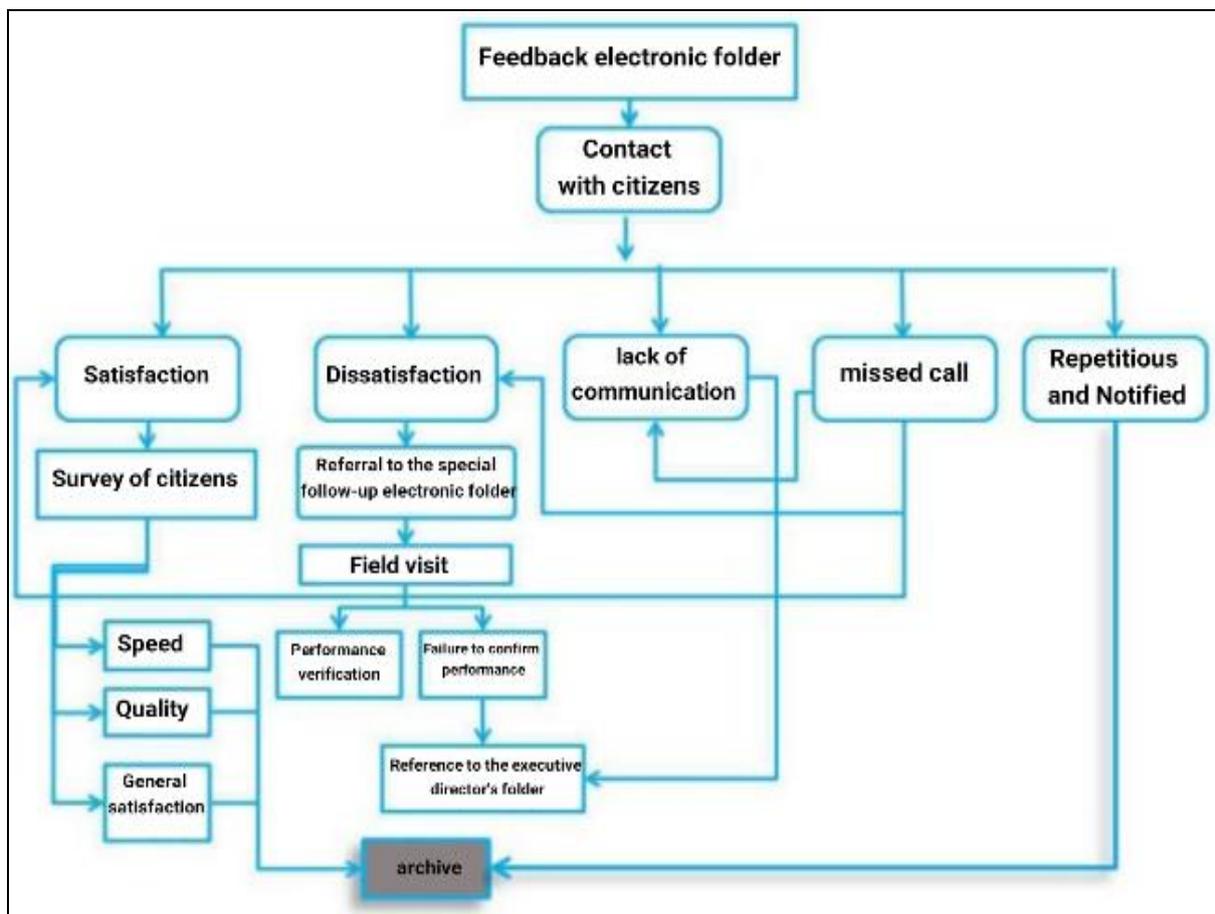


Figure 4. System model of 137 municipalities (this is an organizational chart)

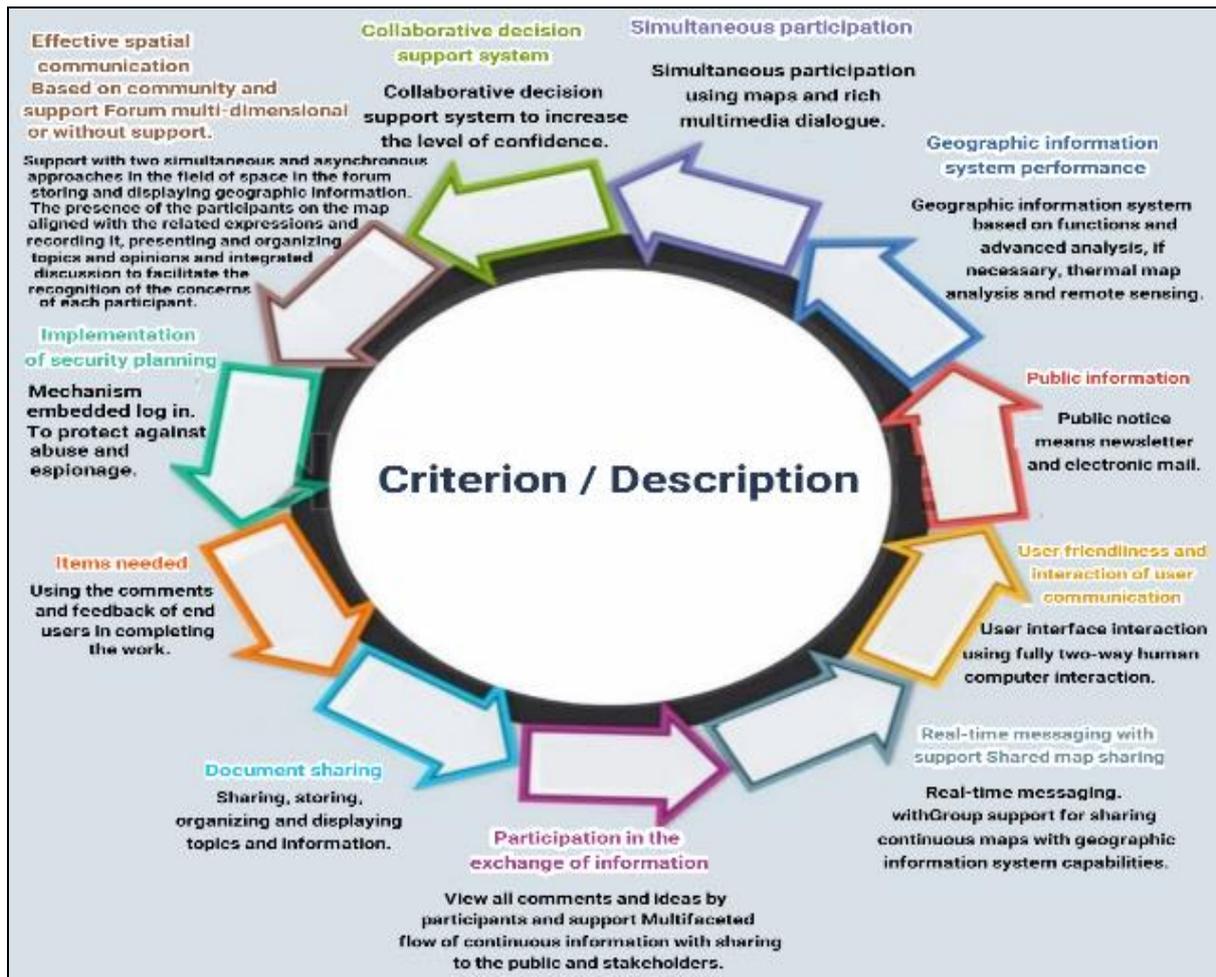


Figure 5. A summary of all criteria and topics

Table 1. Criteria for Urban Service Participants in the Geospatial Information System

Organisasi		Government	Non-Governmental Organizations	Other Agencies	Municipality	Citizens	Commercial interests	Weight
1	Government	1	2	3	3	4	2	0/329
3	Non-governmental organizations	0/5	1	2	3	0/5	1	0/154
6	Other Agencies	0/333	0/5	1	0/5	0/333	0/25	0/061
5	municipality	0/333	0/333	2	1	0/5	0/5	0/086
4	Citizens	0/25	2	3	2	1	0/333	0/151
2	Commercial interests	0/5	1	4	2	2	1	0/218

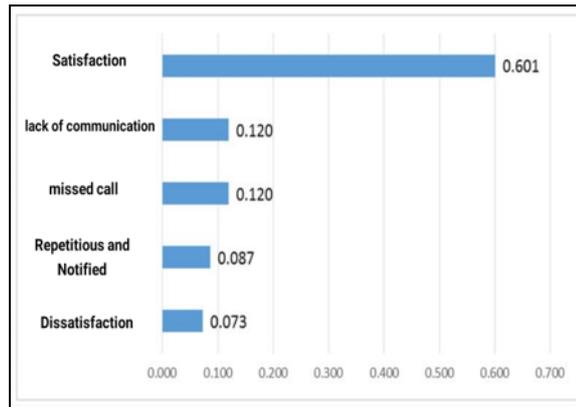


Figure 6. Final weight diagram of two-way and network model criteria

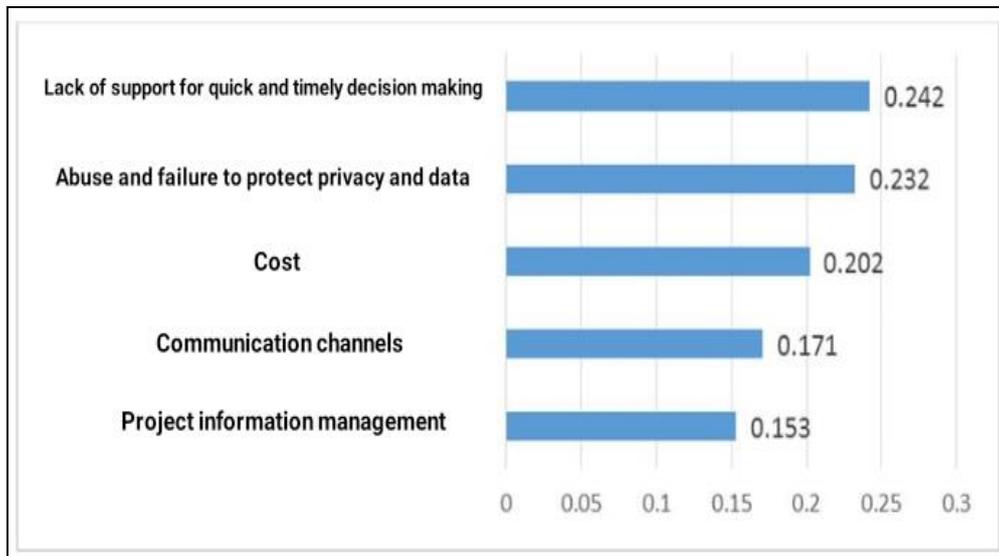


Figure 7. Chart of final weight and criteria priority

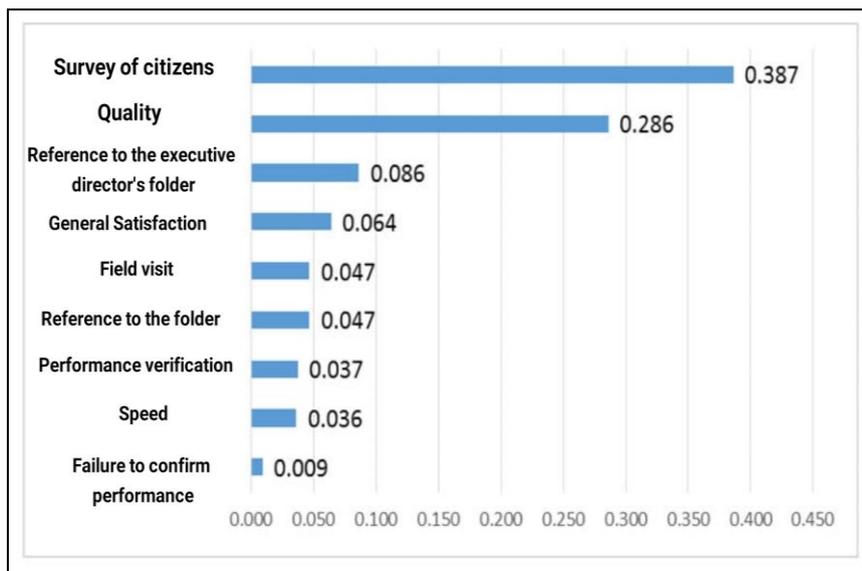


Figure 8. Diagram of the final weight of the two-way model and network sub-criteria

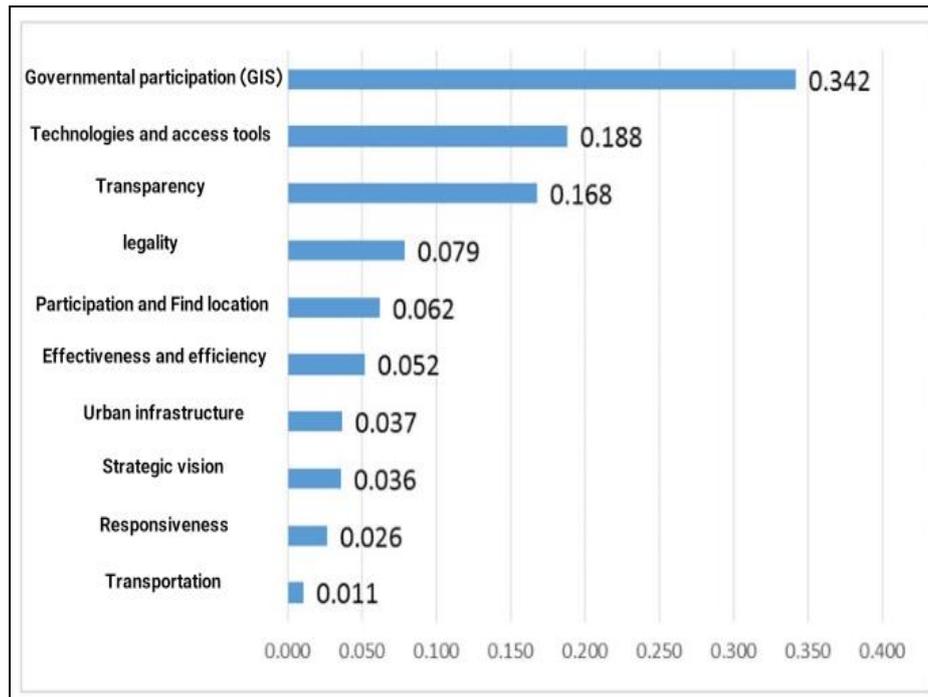


Figure 9. Weighting diagram and final importance of criteria based on social-economic priorities

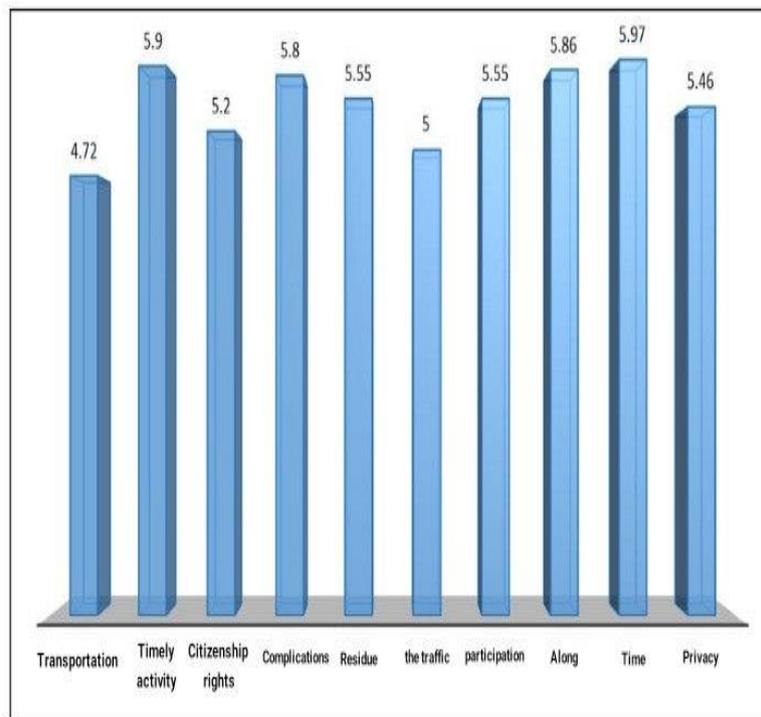


Figure 10. Graph of the average scores of the criteria based on the statistical test

This section was selected as the urban planning section of the Sari regions, assuming that according to its regional reform plans, there was a possible scope for reforms in the municipality in each area. Spatial data related to the corrections were prepared using Google Earth software in the form of GIS files and loaded into a computer as a web-based map layer to be displayed as a KML layer associated with map sharing. This map can be seen in Figure (11), along with 83 locations.

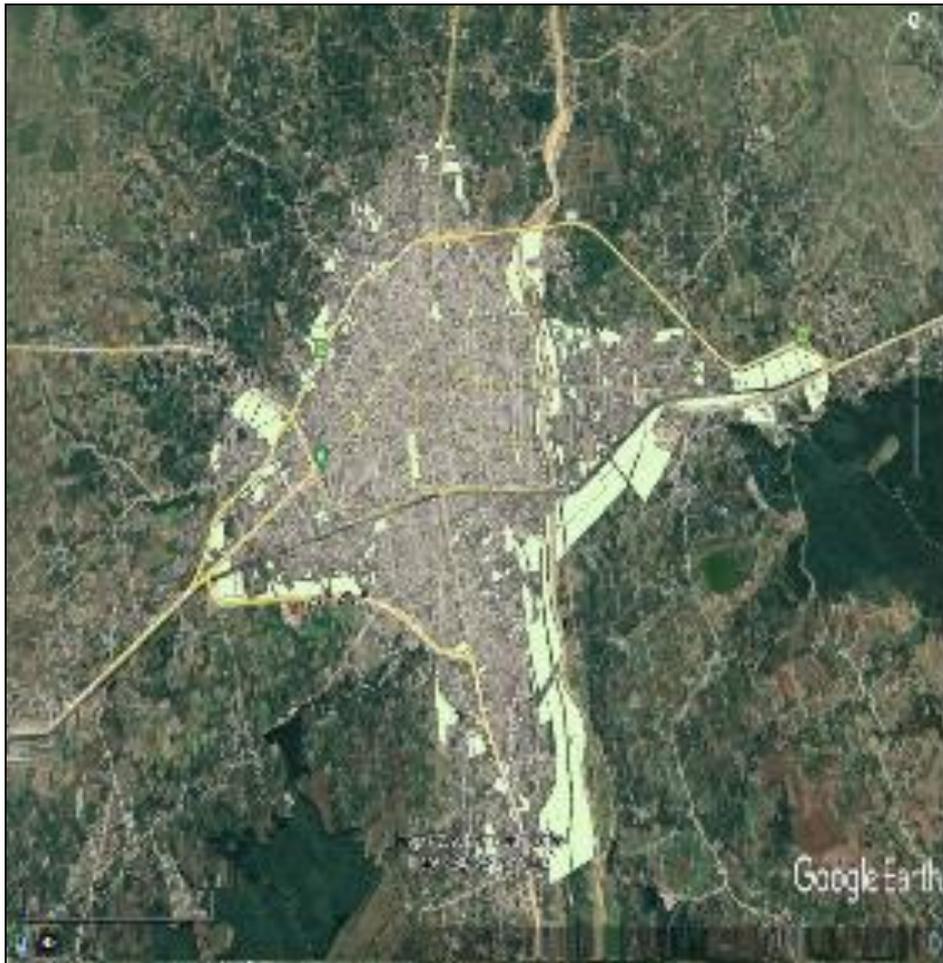


Figure 11. New and creative accesses, preventing accidents on the Google Earth map

CONCLUSION

This study starts with a short discussion related to the formation of software, the construction of the environment and hardware, and all the existing criteria. Then the evaluation process proposed for the participation-oriented information system continues. The methods are discussed, and then the discussion related to the case study and evaluation of the usability of the participatory spatial information system and requirements engineering as a support tool for participatory planning in the municipality was discussed. In the end, statistical analysis and interpretations based on statistics, especially Spearman's correlation, are discussed and demonstrated. The reason for the decision-making is based on statistical analysis, not just comparing decision-making with research because sudden decisions like

early humans are usually made in natural events and away from dangers and the like. This issue has not been seen in any dispute so far. In the following, we realized that the time factor and then being on time are the most important factors, along with the economic criterion. Although planners were expected to be decisive, the results showed otherwise. In practice, it was proved that the basis of software, mathematical and statistical analysis decisions of the groups is the reason for the rise of the economic standard, along with the time factors, which are very necessary for improving the participation with GIS. The role of the power and wealth layer is still colorful, and unlike the priorities, the fastest and most dominant decisions are made by this. So, it should be said that the behavior gap between urban science expert groups and others is undesirable, which means that there is no need for technological skills in

participation and will be investigated in its own time. Soon, many more details of the dissertation from which this article was extracted will be provided by the author of the dissertation in subsequent studies, which will probably be surprising. Anyway, based on the results obtained and the misleading nature of the time issue, it cannot be managed, and people should not worry about time management because they lose their focus. Therefore, they should work on their concentration and be focused on the moment. Only in this way can one use the time effectively and continue the desired activity.

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