Acquiring knowledge using crowdsourcing and AI. Participatory budget and related risks.

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Abstract

The migration process in the world is progressing at a tremendous pace. The formation of ever larger metropolises and urbanized areas is observable. The Smart City concept, which is being implemented in many cities around the world, is gaining more and more importance. With the progressing globalization and the development of urban areas, there are more and more problems related to their management. In the article, the author draws attention to the information gap between decision-makers in cities and residents, the use of modern technologies and artificial intelligence, and the implementation of crowdsourcing to increase communication. Problems related to the Participatory Budget, one of the forms of crowdsourcing, are also discussed. The author also indicates examples of the dangers of using electronic systems.

Keywords

Crowdsourcing, Smart City, Artificial Intelligence, Knowledge Management, Social engineering, threats, security, privacy.

1. Introduction

For many years, we have been observing the progressive process of globalization and migration of people from rural areas to large metropolises and cities. City dwellers lead an easier life with access to services, trade, medicine and communication with other urban centers. Along with the increase in the population in cities and the size of metropolitan areas, problems arise in the efficient functioning of all elements of the city, ranging from traffic jams, pollution, information chaos, ensuring the right amount of energy that is distributed to various sources of its acquisition, as well as the lack of adequate comfort of life that is caused by many other factors. In 2000, people started looking for solutions that would solve the problems of cities and improve their functioning. In the beginning, the IT companies IBM and Cisco invested a lot of money in projects developing the idea of a city that can be intelligent. An extremely important

element of each smart city is the management of information and knowledge possessed by residents and stakeholders. The city can obtain knowledge from its inhabitants and their needs in many ways. One of them is crowdsourcing, which allows to share the knowledge of the crowd with the other party - in the case of cities, it can be local governments, presidents, mayors. In this case, the appropriate mechanism for distributing knowledge and information between all parties - city decision makers, residents, universities, business, as well as specific procedures allowing for effective management of this information and the needs of other parties must be extremely important. The article consists of 4 parts. The first is a description of Smart City. The author presents how electronic tools and artificial intelligence support information processes in the area of cities. The second chapter discusses the processes related to crowdsourcing and gaining knowledge from the crowd by decision-makers. The third part focuses on the participatory budgeting as a tool for the exchange of information about the needs of

residents on the example of the cities of Montpellier in France and Wroclaw in Poland. The last chapter discusses the factors that make people want to share knowledge, use IT tools, and communicate through artificial intelligence. This chapter discusses security issues and potential problems that can disrupt communication between decision-makers and city dwellers using electronic systems.

2. First level heading

The first mentions and definitions in the field of Smart City and a smart society that cares about the quality of life, transport, urban management, health and education, and thus collectively connecting various spheres of life in the city, appeared at the turn of the 20th and 21st centuries. The literature (Choenni, 2001), (Giffinger, 2007), (Dirks, 2010) covers the most important areas of agglomeration development and the potential possibilities of implementing Smart City solutions. Smart's concept can be considered in several respects [1]. This can lead to a closer understanding of the whole concept and ideology. From the position of marketing, the concept of Smart is directed at the user. Smart is much more friendly to people using terminology instead of intelligent. It is used due to the wide base of recipients. In turn, the urban planning perfectives are

treated as a normative claim and ideological dimension. This is used image-wise by governments and societies. The concept of Smart in tele informatics and technologies indicates a large automation and intelligent technical solutions with the current development of modern electronic tools.

The author has conducted a research among the residents of the city of Wroclaw, Poland with which they associate the concept of Smart City. The survey was conducted among 200 city residents, taking into account the gender, age and professional orientation. The study was carried out in December 2018 in paper form in Polish.
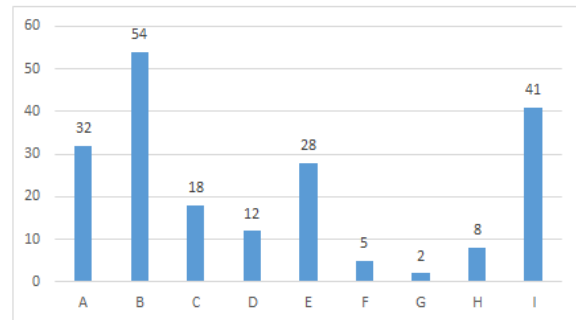

Chart legend:

A - Intelligent public transport
B - New teleinformation systems
C - Fast Internet
D - Professional health service
E - Clean air and renewable energy sources
F - Social ties
G - Exchange of knowledge
H - Facilitation in shopping
I - Easy contact with the city administration

Figure 1: Associations regarding Smart City.

The results of the survey indicate that only 3.5% of respondents associate the idea of Smart City with the creation of a human community and the exchange of knowledge between residents. This is a very small result, especially since the Smart City concept aims to change the residents' mentality into action rather than just participating in a passive form. As many as 27% of those surveyed associate Smart City with modern ICT systems. Respondents pointed to increasing mobility and facilitating access to e-mail, e-services, increasing hotspots with free internet access in the city, as well as a fast Internet connection. Over a half of respondents, identify Smart City with modern technologies and technical issues related to facilitating the comfort of life. A small awareness of active participation in society as a creator / co-creator of society affects the lack of knowledge sharing processes in society. In turn, government administration does not receive signals from residents of the need to create knowledge banks, tools to support the exchange of knowledge and information between people residing in a given metropolitan area, which results in the lack of implementation of such solutions.

Smart City is a concept containing a number of amenities for residents, affecting the comfort of life, standards and Smart Society. The author has collected examples of applications in the Smart City area and divided the concept into areas that are closely related to each other, and which indicate the most important fragments classified as Smart.

Smart Business	• Support for investors • Business events in the city
Smart human capital	• Knowledge groups • Bank of competense
Smart Management	• Communication between 4 gropus of community • Referendums and votings
Smart Environment	• Smart Trash with a geolocation • Sensors system
Smart Transportation	• Position of the vehicles • City parking system
Smart IT	• IT services and maps • Comprehensive package in the cloud for residents
Smart Everyday Life & Communication	• Social media for residents • Search people by personality • Smart shopping with RFID technology • Supporting in daily activities
Smart Care	• Consultations with doctors • On-line prescriptions
Smart Future	• Planning for the further development of ideas • Control of the other modules

Figure 2: Division of Smart City areas.

The author notes that one of the most important elements of the Smart City concept is the exchange of information between all parties. Efficient and effective management of information processes in the city may affect the proper management of the entire agglomeration and increase the comfort of residents.

The method proposed in the article - acquiring knowledge from the public, can be done through crowdsourcing.
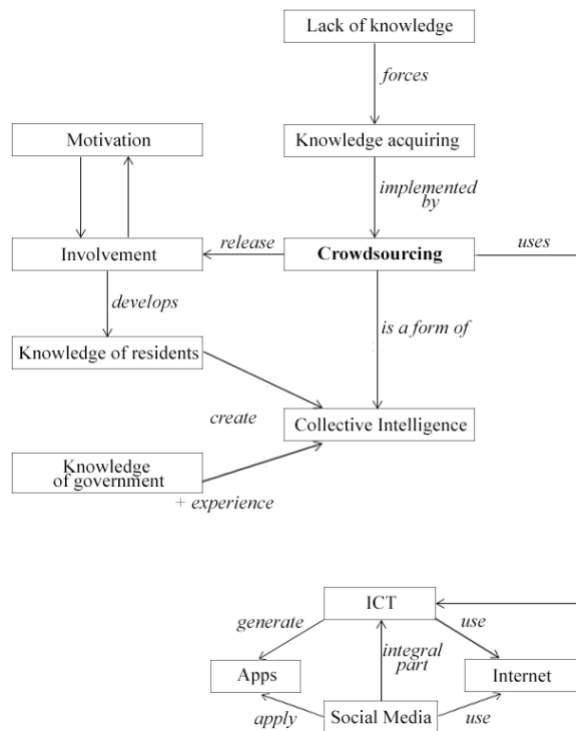
3. Crowdsourcing - acquiring knowledge through the use of AI

The author focuses in the article on the possibility of using crowdsourcing or acquiring knowledge from the crowd by creating and implementing a portal for residents and other ICT channels that will support the technical exchange of information between residents, shareholders and owners. This topic is extremely important because there is a communication gap between residents and decision-makers. The use of crowdsourcing can aid communication and fill the gap. Other authors dealing with the subject of crowdsourcing focus on other aspects, mainly related to handling large amounts of data and mapping urban realities to those prevailing in corporations and business.

The topic of using crowdsourcing in the Smart City area has already been used several times in scientific articles as a diversification in the area of unused data. However, other authors did not pay attention to the electronic tool that could be used for this process, considering all sides of the process. T. Alizadeh in the article "Crowdsourced Smart Cities versus Corporate Smart Cities" (2018) points to the dedication to the inhabitants of the grassroots initiative of acquiring knowledge by stakeholders, but jointly with corporations and third parties [2]. The article takes up the challenge of broadening the theoretical view of smart cities, offering a bottom-up understanding of the concept of "smart city", with particular emphasis on the potential of passive ocean-based crowdsourcing of mostly unused and unused available public domain data. Another author, M. Zook, in the article "Crowd-sourcing the smart city: Using big geosocial media metric in urban governance" (2017) describes the problem of information overload and the use of crowdsourcing with Big Data systems. This article discusses both the historical depth of the main ideas in smart city management - in particular the idea that enough data / information / knowledge can solve social problems - but also the ways in which the latest version differs [3]. Hong Xu and Xuexian Geng have a different view. The article "People-Centric Service Intelligence for Smart Cities" (2019) introduces the concept of human-centric service intelligence, defines its level and challenges in terms of infrastructure, human dynamics, human understanding and prediction, and human machine interface [4].

The author has created a diagram illustrating the distribution of knowledge and information in the area of Smart City. Crowdsourcing is a response to the lack of knowledge. It enforces commitment that is directly related to motivation. It is extremely important to observe the factors affecting the willingness to share knowledge of residents and to answer the question what elements contribute to increasing the motivation of participants.

Figure 3: Semantic network presenting crowdsourcing contexts as methods of acquiring knowledge.

The most important research questions that focus on knowledge acquisition factors:

1. What factors determine stakeholder involvement in acquiring knowledge?
2. What tools are used to acquire knowledge from stakeholders?
3. To what extent and scope can the acquired knowledge be used in Smart City ventures?

The crowdsourcing process requires tools that will support the acquisition of information and exchange of knowledge between decision makers, residents and stakeholders. As the author mentioned in the previous section, Crowdsourcing uses modern ICT, which in turn uses the Internet. In turn, social media that also use the Internet are an integral part of ICT, and also use applications that generate ICT. An important element is also the resident platform, which is an independent creation installed on city servers, most often in the form of a Content Management System. Thanks to it, it is possible to obtain a large amount of information and adapt its functionality to appropriate parameters according to the specification and in relation to a given agglomeration. Knowledge acquisition area - Smart City is a rather specific place that requires special technical infrastructure and conditions that

will affect the proper information exchange process. Nicos Komninos believes that an intelligent city is an area (commune, district, cluster, city, city-region) consisting of four main elements [5]:

- Creative population implementing activities that intensively use knowledge or a cluster of such activities.
- Effective institutions and procedures for creating knowledge that enable it to be acquired, adapted and developed [6].
- Developed broadband infrastructure, digital spaces, e-services and on-line knowledge management tools [7].
- Documented ability to innovate, manage and solve problems that appear for the first time, because innovation and management in uncertainty conditions are key to assess intelligence.

The main advantages of crowdsourcing in relation to the urban community may include [8][9]:

- Saves time and money (the crowd generates ideas much faster and preparing a website is definitely cheaper than paying for the work of a narrow, specialized team).
- Variety of submitted projects and their originality (many perspectives and points of view).
- Obtaining information on the needs and expectations of residents.
- Creating an engaged community.
- Marketing and promotional benefits.

Crowdsourcing is present in many cities in various forms. Recently, popular in Smart Cities is the civic budget (participatory budget), which takes into account the invest-ment propositions of residents and is aimed strictly at citizens. It consists in submit-ting proposals and investment needs in a given agglomeration. Residents directly decide what they need and local authorities interact with them [10]. In this case, city decision-makers only support the process from the technical side and verify the sub-mitted proposals in terms of compliance with the regulations (e.g. whether the tasks fall within the previously indicated financial pool intended for all investments in the city). A simplified diagram of the citizens' budget is presented below.

Web platform

- The city provides a platform where residents can submit proposals to the civic budget

Proposals of investment plans

- Residents submit their proposals which, in their opinion, deserve to be implemented within the allocated funds by the local administration

Verification of applications

- The city administration verifies the submitted proposals. In case of exceeding the assumed budget or non-compliance with the regulations, some proposals are removed from the list

Voting

- Residents can log in to the user panel on the city portal in the place where voting takes place. The administration sets a time interval when it will be possible to vote for investments

Final announcement of results

- After the deadline, the city administration announces the final list of tasks that will be implemented within the budget

Realization of investments

- In the last step, investments are in the process of implementation

Figure 4: Mechanism of participatory budget.

4. Threats affecting crowdsourcing processes using AI

The implementation of a participatory budget is associated with a special verification of security issues and procedures for potential attacks and attempts to extort private data from the system. Because in the participatory system there are private data such as name, surname, address of the resident or identification number, it is necessary to ensure detailed security for all system users, both for residents and ordinary users, as well as for city administration, moderators and administrators.

Security issues are particularly important as they determine crowd trust in the system and a one-off security incident may affect the continued trust of residents as well as the reputation of the city administration. The incident may disrupt the further functioning of voting, and thus block further investments in the field of participatory budgeting. In the table, the author presents the threats that may appear with the time of functioning of the system in question.

Table 1

Examples of frauds that can appear in a participatory budget.

The type of threat	Threat description	Suggested solution
Lack of trust in electronic systems supporting participatory budgets by residents	Many people do not believe in technologies such as information systems, web applications etc.	Decision makers should develop the awareness of residents as part of Smart Society. Inhabitants, especially the elderly, should have computer training, systematically implemented to use city systems with the help of electronics
Frauding scams	Residents can fall victim to fraudulent impersonation of city officials. They may receive a fake link to vote on projects or give private details to fraudsters	The city should deliver messages on the authorized website and the applications should contain safeguards and guidance on the target sources of information.
No security provided	The ability to log into the system of unauthorized persons, weak security for administrators	The system should be written by a company specializing in this type of systems, with proper verification. It should be possible to log in only for residents living in a given area, e.g. by synchronizing the residents' cards with the system and the security of using

		the system for administrators and moderators
Social engineering	Manipulations related to breaking democracy, influencing and manipulating residents	The system should be accessible to the city administration, decision makers, but also representatives of e.g. housing estates. Persons unrelated to politics who will watch over the correctness of all processes
Hacker attack	System operation blocked	In the event of a hacking attack, the system should have a backup that will be activated after the main server is blocked. To minimize the risk of a hacker attack, the system should be updated on a regular basis (in particular, applications based on Open Code, e.g. CMSs based on the GNU GPL license to which thousands of programmers have access)

The city should provide adequate security in the event of a hacking attack or other threat. Each implementation of new systems raises new threats, but proper supervision should eliminate potential risks.

5. Conclusion

The idea of Smart City is gaining in value every year, new concepts and ideas are developed. Importantly, more and more decision-makers and residents are trying to create a Smart Society that properly manages knowledge, information and decision-making processes in cities. The city administration is trying to reach the inhabitants in order to aggregate their needs. Decision-makers and city administration must take care of security, privacy and appropriate standards of implemented systems that will be used by residents. Thanks to appropriate security measures, systems can gain in importance and trust in them will grow. It has been observed that older people who were digitally excluded are slowly starting to use electronic and internet services. This is a very positive trend that favors the further development of e-government.

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