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## CROWDSOURCING INITIATIVES IN CITY MANAGEMENT: THE PERSPECTIVE OF POLISH LOCAL GOVERNMENTS

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**ABSTRACT:** The past decade has seen the significance of the Internet facilitating communication between local governments and stakeholders. A growing role in this dialogue has been played by crowdsourcing. The paper aims to identify areas, forms, and tools for implementing crowdsourcing in managing cities in Poland, as well as the assessment of benefits provided by crowdsourcing initiatives by representatives of municipal governments. The article utilised a quantitative study method of the survey on a sample of 176 city governments from Poland. Research has shown that crowdsourcing initiatives concern various areas of the city's functioning, including the most common as culture, city image, spatial management and environmental protection. Forms of crowdsourcing involve civic budgets, "voting/polls/surveys and interviews" and "debate/discussion/meeting, workshop, postulates and comments". Local governments carry out crowdsourcing initiatives by utilising cities' official web pages, social media, and special platforms dedicated to public consultations. The larger the city, the more often its representatives employ the forms of crowdsourcing and the greater the value placed on the utility of crowdsourcing.

**KEYWORDS:** crowdsourcing, stakeholder involvement, citizen participation, city management, local government

## Introduction

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Engagement of stakeholders and community-based management has become the main subjects in the discussion concerning decision-making processes (Chirenje et al., 2013), including city management. Within the last several years, a transition from “e-government” to “we-government”, where local authorities treat inhabitants as partners during the making of key decisions, has occurred (Linders, 2012; Kiryluk et al., 2021). The role of crowdsourcing tools in this participatory form of management, allowing local governments to build relationships with stakeholders, has grown. In practice, crowdsourcing instruments are used in various areas of city management, including spatial management (Puzdrakiewicz, 2015; Hajduk, 2020), sustainability (Certomà et al., 2015), environmental protection, health (Wazny, 2017), culture and tourism (Panagiotopoulou et al., 2018), city branding (Roudbari, 2018), innovation (Schuurman et al., 2012), and transport and mobility (Marzano et al., 2019). Studies of relevant literature show that crowdsourcing platforms permit greater involvement of citizens and increase social capital and mutual trust as well as income and reciprocity (Staletić et al., 2020).

However, exploring various stakeholders’ opinions concerning crowdsourcing from the perspective of public organisations such as city governments has been relatively small (Lenart-Gansiniec, 2017a, b).

At the same time, in Poland, following the 2023 National Urban Policy (*Krajowa Polityka Miejska*, 2015), the development of participation is seen as one of the key aspects allowing the creation of an influential city with recommendations made to municipal authorities to perceive participation as a method for city management and everyday activity promoting its development as well as an essential platform for building relationships and connections on the level of local communities. There exists, therefore, a great need for studies devoted to the development of civic engagement in municipal governments, especially in light of the 2018 amendment of the municipal government law (*Raport o stanie polskich miast*, 2019).

The aims of the paper include the identification of areas, forms, and tools for the implementation of crowdsourcing in the management of cities in Poland, as well as the gathering of the opinions expressed by municipal government representatives regarding the utility and tangible benefits of using this method for the engagement of stakeholders in the management of a city. An auxiliary goal of the work is to determine whether there exist statistically significant relations between the implementation of crowdsourcing for city management and the size of the city concerning the number of its inhabitants.

The paper's aims were achieved through the survey, a quantitative study method realised on a sample of 176 governments of Polish cities. The survey was directed at civil servants employed by governments of cities responsible for cooperation with local stakeholders. Results gathered through the conducted study were analysed statistically. On account of having to deal with nominal and ordinal variables, the study made use of such tools as the Kruskal-Wallis test and the Chi-squared test. Calculations were completed using the IBM SPSS Statistics Software.

## An overview of the literature

Crowdsourcing is a relatively new but developing study area (Kovacs et al., 2015). The term (a joining of the words crowd and outsourcing) was first used and defined by Howe (2006) in relation to the practice of addressing a group of people (a crowd) to obtain necessary information, complete particular tasks, or the engagement in the internet community in problem-solving (Cricelli et al., 2021). The concept of crowdsourcing encompasses various practices associated with all types of internet-based collaborative activities, such as co-creation or user innovation (Estellés-Arolas & González-Ladrón-de-Guevara, 2012). However, the definition of crowdsourcing is still being developed and has not yet been agreed upon (Wazny, 2017). It often focuses on a particular type of crowdsourcing initiative. Crowdsourcing is defined as:

- a model of sourcing in which organisations predominantly use advanced internet technologies to harness the efforts of a virtual crowd to perform specific organisational tasks (Howe, 2006);
- a combination of the concept of open innovation–outsourcing with that of crowd wisdom (Roudbari, 2018);
- “a type of participative online activity in which an individual, an institution, a non-profit organisation, or a company proposes, via a flexible open call, to a group of individuals of varying knowledge, heterogeneity, and number the voluntary undertaking of a task” (Estellés-Arolas & González-Ladrón-de-Guevara, 2012);
- “a collaboration model enabled by people-centric web technologies to solve individual, organisational, and societal problems using a dynamically formed crowd of people who respond to an open call for participation” (Pedersen et al., 2013);
- “a set of tools, approaches, and concepts that deal with the process of outsourcing work (including seeking ideas) to a large and possibly unknown group of people (the crowd) usually external to the organisation” (Chiu et al., 2014);

- a process during which the wisdom and potential of the community are used to fulfil the individual's goals or for the greater good. It consists of outsourcing a given task to a crowd or an undetermined number of random people (*Encyklopedia zarządzania*, 2022).

The term crowdsourcing (online citizen participation) is constantly evolving. Based on a comprehensive analysis of existing definitions of this concept, Estellés-Arolas and González-Ladrón-de-Guevara (2012) isolated several elements and characteristics common to crowdsourcing initiatives. These include a clearly defined crowd, a task having an explicit aim, a distinctly identified crowdsourcer or initiator of the crowdsourcing activity, mutually beneficial results of crowdsourcing, a designated online process of the type of participation (process, process type), an open call to participate, and the medium (use of the internet).

There is little consensus in the literature concerning categorising various crowdsourcing activities (Ali-Hassan & Allam, 2016). Howe (2008), for example, proposed four types of crowdsourcing: crowd wisdom or collective intelligence, crowd creation or user-generated content, crowd voting, and crowd-funding (Brabham, 2013). More definitions appeared along with the development of new digital technologies. Ali-Hassan and Allam (2016) identify and classify 12 crowdsourcing initiatives: Crowdpedia, Fansourcing, Crowdfunding, Crowdsourcing, Crowdsourcing, Crowdvoting, Crowdfunding, Ideation, Open Innovation, User Innovation, Scisourcing, Crowd-Relief, and Open Source Software.

Crowdsourcing is the most popular and practical approach to city management (Koniagina et al., 2021; Brzozowska, 2013). It creates new forms of participation in shaping urban culture and community and allows the co-creation of values within the community (Brzozowska, 2013). The growing popularity of crowdsourcing permits processes of city management to utilise various crowdsourcing initiatives, including crowdfunding (where the crowd is tasked with donating money), crowd voting (where it is responsible for voting for and providing opinions regarding a particular subject), and crowd-sensing (where the crowd has to share sensor data from mobile devices).

Comprehensive and systematic reviews of literature concerning studies dealing with crowdsourcing were completed through the works of Pedersen et al. (2013), Zhao and Zhu (2014), Buettner (2015), Hossain and Kauranen (2015), Wazny (2017), Liao et al. (2019) and Cricelli, Grimaldi and Vermicelli (2021). Based on these reviews, it can be ascertained that studies considering crowdsourcing completed thus far have mainly focused on the following issues: theoretical aspects of crowdsourcing (definitions, classifications, the potential) (Brabham, 2008, 2010; Zhang et al., 2019); characteristics of crowdsourcing (Bassi et al., 2020), factors connected to the development of crowdsourcing services (Marcinkowska, 2018) particularly the motivation of the crowd to participate (Brabham, 2010; Bakici et al., 2011; Zheng et al.,

2011; Smith et al., 2013); benefits from the development of crowdsourcing (Schoorman et al., 2012; Przysucha, 2020); similarities and differences in crowdsourcing practices (Kleeman et al., 2008; Ye et al., 2012); the experience of using crowdsourcing and identification of problems connected to the implementation of crowdsourcing practices (Koniagina et al., 2021). However, there are only a few studies considering the process of crowdsourcing, including that concerning possibilities for the utilisation and implementation of crowdsourcing in managing a city both from the perspective of local government representatives (Lenart-Gansiniec, 2017a,b, 2021) as well as inhabitants. Chiu et al. (2014) proposed a classification of crowdsourcing research, including identifying critical research problems and aims.

There are, however, few studies concerning the process of crowdsourcing itself, including those related to the possibilities for the utilisation and implementation of crowdsourcing in city management both from the perspective of municipal government representatives (Lenart-Gansiniec, 2017a,b, 2021) as well as city inhabitants (Staletić et al., 2020). From the standpoint of managing a city, this problem is explored, among others, by Brabham (2009), Schoorman et al. (2012), Certomà et al. (2015), Mueller et al. (2018), Liao et al. (2019), Hajduk (2020), Przysucha (2020).

Studies into crowdsourcing should account for various perspectives and contexts. Based on their review of literature, Zhao and Zhu (2014) identify three principal perspectives of crowdsourcing research: the participant's perspective (motivation, behaviour), the organisation's perspective (governance, evaluation), and the system's perspective (incentive mechanisms, technology issues). A similar approach is displayed by Cricelli et al. (2021). They indicate that research directions into crowdsourcing are connected to the three actors involved in the process: the problem's owner, the intermediary, and the crowd. From the perspective of the problem's owner, the research encompasses, among others, strategic planning, profitability, and project-related issues. When it comes to intermediaries, it involves problems connected to information technology, digitalisation and idea management. At the same time, from the crowd's point of view, it relates to the problem of motivating the public to participate (Ali-Hassan & Allam, 2016). Moreover, crowdsourcing is also a social, spatially embedded, and interactive process of learning which cannot be understood outside of its institutional and cultural context (Ye et al., 2012).

The main benefits of successfully utilising crowdsourcing include idea generation, micro-tasking, citizen science, and public participation (Hossain & Kauranen, 2015).

Crowdsourcing is seen as an innovative method for information gathering, encouraging innovation, and facilitating group decision-making (Liao et al., 2019), a strategic model of involving a motivated crowd in providing bet-

ter solutions (Brabham, 2008), and an essential instrument of participatory management (Chiu et al., 2014).

Crowdsourcing establishes a new model of social participation facilitated by digital technologies that provide various possibilities for interaction between local governments and stakeholders. It can become a source of knowledge regarding the needs and demands of inhabitants concerning the development of the city and the solution to its problems. It is essential for collaboration and contribution of stakeholders in managing the city, including determining critical decisions connected with the local community.

Research by Hossain and Kauranen (2015) shows that although crowdsourcing possesses excellent untapped potential, its utilisation is growing exponentially. This is because it is a strategic instrument of innovative processes (Howe, 2008) as well as an effective model for problem-solving (a model that is capable of aggregating talent and leveraging ingenuity while reducing costs and time formerly needed to solve problems) (Brabham, 2008). The reduced time required to find solutions for a given problem mainly results from the inclusion of external knowledge (Schildhauer & Voss, 2013). It is necessary to remember, however, that involving the inhabitants of a city in its management may substantially extend the time needed to arrive at decisions (*Krajowa Polityka Miejska*, 2015).

Within subject-related literature, areas of crowdsourcing identified as deserving future study include mainly those regions where consensus has either not been achieved or is very tentative such as the classification of various types of crowdsourcing activity, analysis of relations between crowdsourcing and other related concepts like Open Innovation (Alhalabi et al., 2021; Moustaka et al., 2021; Cricelli et al., 2021) or Outsourcing, and the identification of their similarities and differences permitting more excellent profiling of the concept of crowdsourcing and the establishment of a theoretical framework (Estellés-Arolas & González-Ladrón-de-Guevara, 2012). Pedersen et al. (2013) indicate a need for more in-depth research into motivating potential users to participate in crowdsourcing, while Hossain and Kauranen (2015) propose studies into the implementation, benefits, and challenges connected with crowdsourcing and those related to the utilisation of crowdsourcing for the development of society and the management of various social problems in developing countries.

## Research methods

The achievement of the article's aims was possible thanks to the analysis of the empirical material gathered as a result of the completion of the diagnostic survey conducted among people employed by governments of Polish

cities responsible for collaboration with stakeholders. The survey research encompassed 302 urban communes (100% urban communes in Poland), including 66 that were also provincial capital cities.

The study was conducted using computer-assisted web interviewing (CAWI) in February and March 2021. Survey questionnaires were sent to municipal offices electronically using e-mail addresses from the territorial government authorities database available on the Ministry of Internal Affairs and Administration website on January 13th, 2021. In total, 176 completed questionnaires were returned. These were subsequently subjected to statistical analysis. The questionnaire return rate (sample realisation indicator) reached 58%, with a standardised questionnaire being the research tool.

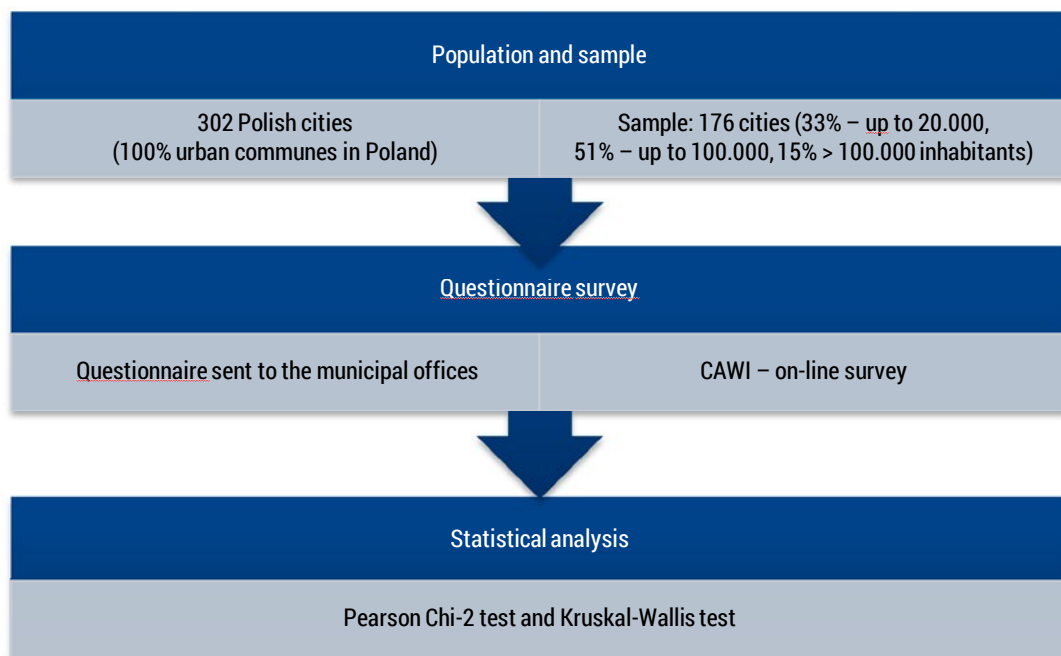


Figure 1. The course of the research process

Source: authors' work.

The study utilised an authors-developed questionnaire consisting of 14 closed-ended questions, 3 open-ended questions, as well as demographic questions. During the construction of these questions, the authors made use of research tools employed by the works of such authors as Brabham (2008), Haltofova (2018) and Raport o stanie polskich miast (2019). The use of the term “crowdsourcing” within the practice of local government functions is not everyday, a fact that had been taken into account during the preparation of the questionnaire. The word crowdsourcing was replaced in the title and

individual questions posed within the questionnaire with its definition: “the involvement of stakeholders in city management through the utilisation of the Internet and modern technologies”.

The course of the research process is presented in Figure 1.

Most survey questionnaires that had been properly completed and returned came from (51%) of municipal offices of cities having from 20 to 100 thousand inhabitants. One in three questionnaires was sent back by cities having up to 20 thousand inhabitants. Nearly 15% of the sample consisted of respondents representing cities with more than 100 thousand citizens. The sample included cities from all 16 provinces of Poland.

Research results were analysed using the IBM SPSS Statistics software, utilising Pearson’s Chi-squared and Kruskal-Wallis tests.

Pearson’s Chi-squared statistical independence test was employed to ascertain whether statistically significant relations occurred between nominal or ordinal variables (Rycielski & Brzezicka, 2013). The following symbols were utilised in tables illustrating the results of Pearson’s Chi-square test: N – number, % – percentage, Chi-2 – Chi-squared test values, and p – the significance of Pearson’s Chi-squared test. Three levels of statistical significance were accepted:  $p < 0,001$ , designated using \*\*\*,  $p < 0,01$ , marked with \*\*, and  $p < 0,05$ , described with \*.

The Kruskal-Wallis test was employed to determine whether more than two groups differed from one another in a manner that was statistically significant concerning variables measured on the ordinal level or those measured on the quotient level but whose distribution differed significantly statistically from standard distribution (Niewiarowski et al., 2013). Following symbols were used in the tables presenting results of the Kruskal-Wallis test: H – Kruskal-Wallis test values, p – the significance of the Kruskal-Wallis test (three levels of statistical significance were accepted:  $p < 0,001$ , designated using \*\*\*,  $p < 0,01$ , marked with \*\*, and  $p < 0,05$  described with\*), R.I. – significant differences or which groups were statistically significantly different from one another and what was the trend of this difference (< or >).

## Results of the research

The following research questions were formulated before the initiation of the study:

**RQ1** Which areas, forms, and tools do the implementation of crowdsourcing in managing cities in Poland concern?

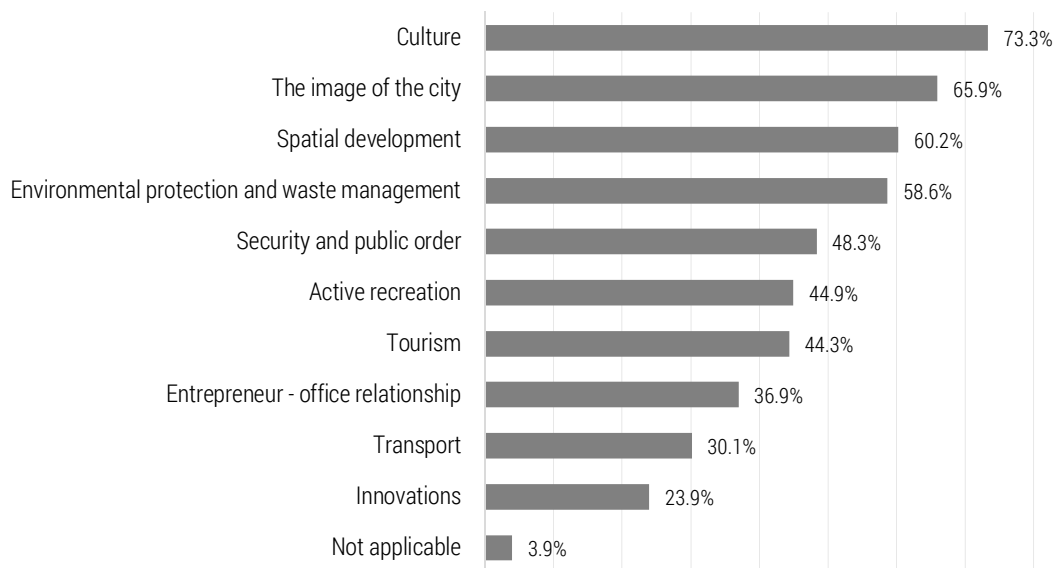
**RQ2** Are there statistically significant relations between the areas, forms, and tools of using crowdsourcing in city management and the size of a city?



### RQ3 What is the opinion of municipal office representatives on the usefulness and benefits of using crowdsourcing for city management?

The survey results analysis encompasses three segments closely connected with answering the research questions above.

The first segment focuses on presenting the structure of answers connected to RQ1 or identifying areas, forms, and tools for implementing crowdsourcing in the management of Polish cities.



**Figure 2.** Areas of stakeholders' involvement in city management with the use of crowdsourcing (n=176)

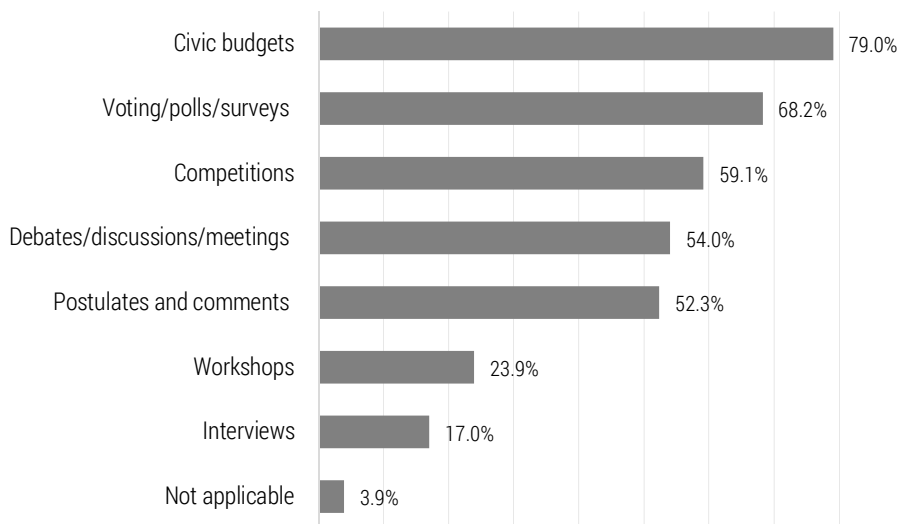
\* The percentages do not add up to 100 as it was possible to choose more than one answer for a given question

Source: authors' work.

Survey results have proven that the main areas in which municipal governments use the engagement of stakeholders in city management in Poland through various forms of crowdsourcing include culture (73.3%), city image (65.9%), spatial development (60.2%) as well as environmental protection and waste management (58.6%) (Figure 2). The adaptation of crowdsourcing for the solution of local problems related to those aspects of city function was declared on average by 2/3 of municipal government representatives included in the study. A little less frequently, although still quite often (approximately 40% of answers each), city governments involve stakeholders in city management in security and public order, active recreation, tourism, and relations between entrepreneurs and city hall. Nearly a third of

municipal governments included in the survey involved stakeholders in issues connected to decision-making concerning transport, and a quarter of them were in the broadly-understood area of local innovation.

Respondents were asked to indicate forms of stakeholder engagement in city management through the use of the Internet and modern technologies utilised by municipal governments that they represent. The structure of answers to this question is presented in Figure 3. The most popular forms of involving stakeholders in city management using crowdsourcing include civic budgets (79%), voting/polls/surveys (68.2%), and the organisation of competitions (59.1%). A significant percentage of respondents indicated debates/discussions/meetings (54%) and acceptance of proposed postulates and comments (52.3%).



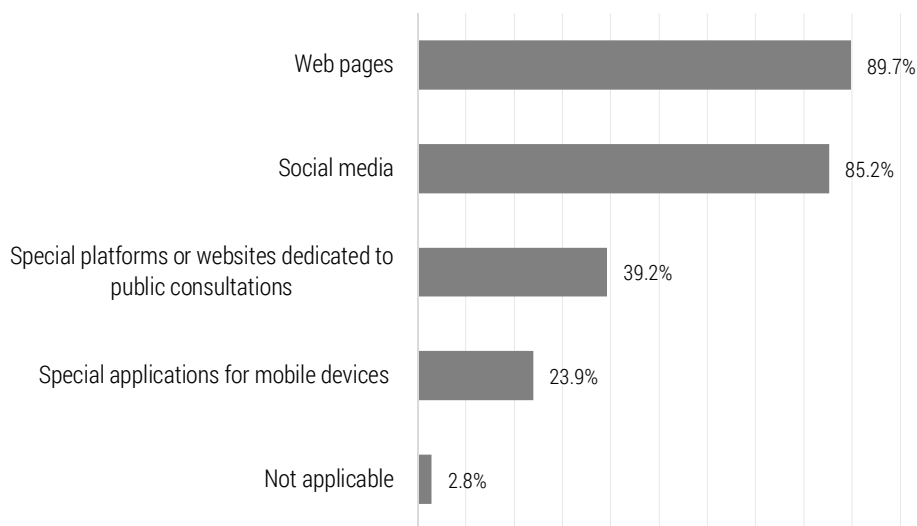
**Figure 3.** Forms of stakeholder involvement used by local governments in city management with the use of crowdsourcing (n = 176)

\* The percentages do not add up to 100 as it was possible to choose more than one answer for a given question

Source: authors' work.

Since the application of crowdsourcing concerns, various practices employing many types of Internet-based collaborative activity (Estellés-Arolas & González-Ladrón-de-Guevara, 2012), the respondents were asked about the most commonly used communication instruments utilised to involve stakeholders in city management. Survey results have shown (Figure 4) that the most popular tools exploited in crowdsourcing initiatives by municipal governments participating in the study include cities' web pages

(89.7%), social media (85.2%), and special platforms or websites dedicated to public consultations (39.2%). One in four city halls taking part in the study uses special applications for mobile devices in crowdsourcing initiatives, it realises. Having an internet platform dedicated to consulting the public is not very common among city governments involved in the study. Even less frequently than using such a platform, cities declare the utilisation of special applications for mobile devices in their realisation of crowdsourcing initiatives.



**Figure 4.** Communication instruments used in the process of involving stakeholders in city management (n = 176)

\* Percentages do not add up to 100 since it was possible to choose more than one answer to a given question.

Source: authors' work.

The next portion of survey result analyses focused on finding the answers to **RQ2**. To determine whether there are statistically significant dependences between subject areas where stakeholders are involved in city management and the size of the city, the authors used the Chi-squared test of  $\chi^2$  (utilised to test nominal variable independence hypotheses) (Table 1). Based on completed calculations, it has been ascertained that concerning most variable pairs, the results of the Chi-squared test do not allow the rejection of null hypotheses (concerning the independence of analysed variables) and the acceptance of an idea that there exist connections between them. Chi-squared test values have indicated a statistically significant relation only concerning one pair of variables: relations between entrepreneurs and city hall and

innovation and city size. Cities having more than 100 thousand inhabitants utilise crowdsourcing initiatives to solve problems connected with the collaboration between city hall and entrepreneurs and those related to the implementation of local innovation much more frequently (51.9% of responses) than those having from 20 to 100 thousand citizens (23.3% of answers) or those with less than 20 thousand inhabitants (13.6% of reactions).

**Table 1.** Relations between stakeholder involvement areas in city management and city size (n = 176)

Stakeholder involvement areas in city management using the Internet and modern technologies	City size	N	Total %	Value of the chi-squared statistic; level of significance
Image, culture, tourism, active recreation, spatial management	Up to 20 thous.	47	79.7	$\chi^2=4.005$ $p=0.135$
	Up to 100 thous.	82	91.1	
	> 100 thous.	23	85.2	
Safety and public order, transport	Up to 20 thous.	31	52.5	$\chi^2=2.038$ $p=0.361$
	Up to 100 thous.	56	62.2	
	> 100 thous.	18	66.7	
Environmental protection and waste management	Up to 20 thous.	44	74.6	$\chi^2=2.929$ $p=0.231$
	Up to 100 thous.	77	85.6	
	> 100 thous.	21	77.8	
Relations between entrepreneurs – city hall and innovations	Up to 20 thous.	8	13.6	$\chi^2=14.832$ $p=0.001^{**}$
	Up to 100 thous.	21	23.3	
	> 100 thous.	14	51.9	

Note: **N** – number, % – percentage,  $\chi^2$  – Chi-squared test values, and **p** – the significance of Pearson's Chi-squared test. Three levels of statistical significance were accepted:  $p < 0.001$ , designated using **\*\*\***,  $p < 0.01$ , marked with **\*\***, and  $p < 0.05$  described with **\***.

Source: authors' work.

Values of the  $\chi^2$  Chi-squared test (Table 2) prove that statistically significant relations exist between forms of stakeholder involvement in city management through the use of the Internet and modern technologies utilised by local government and city size. This dependence has been observed concerning civic budgeting, which is used in cities having an excess of 100 thousand inhabitants (92% of responses) and those with up to 100 thousand citizens (88% of responses) much more often than in cities populated by fewer than 20 thousand dwellers (58% of reactions). The larger the city, the greater the

percentage of respondents who indicate the utilisation of debates/discussions/meetings and other connected forms of dialogue with stakeholders – from 63% in cities with up to 20 thousand inhabitants to as much as 89% in those having more than 100 thousand citizens. This is also true regarding the percentage of participants' responses regarding the use of voting/polls/surveys and interviews – starting with 58% in cities with less than 20 thousand inhabitants to as much as 96% in cities populated by more than 100 thousand people.

**Table 2.** Relations between forms of stakeholder involvement in city management and city size (n=176)

Forms of stakeholder involvement in city management	City size	N	Total %	Chi-squared value; significance level
Civic budget	Up to 20 thous.	34	57.6	$\chi^2=22.926$ $p<0.001$ ***
	Up to 100 thous.	79	87.8	
	> 100 thous.	25	92.6	
Debate / discussion / meeting, workshop, postulates and comments	Up to 20 thous.	37	62.7	$\chi^2=7.234$ $p=0.026$ *
	Up to 100 thous.	69	76.7	
	> 100 thous.	24	88.9	
Voting / poll / survey, interview	Up to 20 thous.	34	57.6	$\chi^2=13.587$ $p=0.001$ **
	Up to 100 thous.	65	72.2	
	> 100 thous.	26	96.3	
Competition	Up to 20 thous.	29	49.2	$\chi^2=5.283$ $p=0.071$
	Up to 100 thous.	56	62.2	
	> 100 thous.	20	74.1	

Note: **N** – number, % – percentage,  $\chi^2$  – Chi-squared test values, and **p** – the significance of Pearson's Chi-squared test. Three levels of statistical significance were accepted:  $p<0.001$ , designated using \*\*\*,  $p<0.01$ , marked with \*\*, and  $p<0.05$  described with \*.

Source: authors' work.

Respondents assessed the significance of individual crowdsourcing instruments in stakeholder involvement in city management using a scale ranging from 1 to 5, where the more significant the importance, the higher the number. Average, median, and standard deviations were calculated based on these evaluations. The Kruskal-Wallis test (Table 3) has shown that respondents representing cities inhabited by more than 100 thousand people rate the relevance of a city's website much higher than those from munic-

ipalities with less than 100 thousand inhabitants. Additionally, respondents from cities populated by more than 100 thousand citizens assess the importance of special platforms or internet pages dedicated to social consultations at a much higher level than those from cities with less than 100 thousand people and those from cities having up to 20 thousand inhabitants. The test did not demonstrate statistically significant differences concerning the assessment of the importance of applications for mobile devices or social media in the process of stakeholder involvement in city management.

**Table 3.** Differences in the assessment of the importance of crowdsourcing instruments concerning city size (Kruskal-Wallis test)

Assessment of the importance of crowdsourcing instruments	City size	Average	Median	Standard deviation	Kruskal-Wallis Test
Special platform or internet website dedicated to social consultations	Up to 20 thous. (1)	2,97	3,00	1,26	H=16.512 <b>p</b> <0.001*** R.I.:3>2.1
	Up to 100 thous. (2)	3,31	3,00	1,15	
	> 100 thous. (3)	4,07	4,00	1,00	
	Total	3.31	4.00	1.21	
The city's web page	Up to 20 thous. (1)	3.86	4.00	0.94	H=6.676 <b>p</b> =0.023* R.I.:3>2
	Up to 100 thous. (2)	3.83	4.00	0.81	
	> 100 thous. (3)	4.30	4.00	0.61	
	Total	3.91	4.00	0.84	
Application for mobile devices	Up to 20 thous. (1)	3.05	3.00	1.28	H=3.136 <b>p</b> =0.208
	Up to 100 thous. (2)	3.14	3.00	1.27	
	> 100 thous. (3)	3.63	4.00	1.08	
	Total	3.19	3.00	1.25	
Social media	Up to 20 thous. (1)	4.12	4.00	0.83	H=3.288 <b>p</b> =0.193
	Up to 100 thous. (2)	4.14	4.00	0.95	
	> 100 thous. (3)	4.48	4.00	0.51	
	Total	4.19	4.00	0.86	

Note: H – Kruskal-Wallis test value, **p** – the significance of the Kruskal-Wallis test (three levels of statistical significance were accepted: **p**<0.001, designated using \*\*\*, **p**<0.01, marked with \*\*, and **p**<0.05 described with \*), R.I.- significant differences or which groups show statistically significant differences and what is the trend of this difference (< or >).

Source: authors' work.

According to recommendations by Zhao and Zhu (2014), when adopting the organisational perspective in research dealing with crowdsourcing, it is worthwhile to consider the assessment of this instrument by those managing a given entity. In their search for answers to **RQ3**, the authors of the present study focused on gaining the opinions of respondents regarding the use of crowdsourcing in managing a city as well as on identifying benefits that representatives of municipal authorities see in using this instrument for social consultations.

Nearly 2/3 of study participants declared that crowdsourcing employment in city management is beneficial. Little over 28% of respondents assessed crowdsourcing utility as average, while 7.6% saw it as having low usefulness.

The analysis of the relation between the assessment of crowdsourcing usefulness and the size of a city was performed in two ways. First, a contingency table (Table 4) containing three levels of assessment: “low”, a combination of values from answers “rather low” and “shallow”, “average”, and high, showing the combined values of solutions “rather high” and “very high”, cross-referenced with the city’s size was prepared.

**Table 4.** Relations between the assessment of the usefulness of crowdsourcing and city size (n=176)

Relations between the assessment of the usefulness of crowdsourcing and city size (n=176)	City size						Total	
	Up to 20 thous.		Up to 100 thous.		> 100 thous.			
	N	%	N	%	N	%	N	%
Low	9	15.8	3	3.4	1	3.7	13	7.6
Average	20	35.1	23	26.1	6	22.2	49	28.5
High	28	49.1	62	70.5	20	74.1	110	64.0
Total	57	100.0	88	100.0	27	100.0	172	100.0

Chi-squared values; significance level:  $\chi^2=12.034$ ,  $p=0.017^*$

Note: **N** – number, % – percentage,  $\chi^2$  – Chi-squared test values, and **p** – the significance of Pearson’s Chi-squared test. Three levels of statistical significance were accepted:  $p<0.001$ , designated using \*\*\*,  $p<0.01$ , marked with \*\*, and  $p<0.05$  described with \*.

Source: authors’ work.

The Chi-squared test showed a statistically significant relationship between city size and the assessment of the usefulness of crowdsourcing. It turned out that its usefulness was indicated as high by many more respondents from large (74.1%) and medium-sized (70.5%) cities than from small

cities (49.1%). In turn, many more respondents from small cities (15.8%) than those from medium-sized (3.4%) and large (3.7%) cities indicated its usefulness as low.

In the next stage of the study, respondents' answers were assigned a value on a scale from 1 to 5, where the higher the value, the higher the assessment of usefulness, and then values of various-sized cities were compared with one another (Table 5). The value of the Kruskal-Wallis test was also determined.

**Table 5.** Assessment of the usefulness of utilised crowdsourcing instruments in city management and city size (Kruskal-Wallis test)

City size	Average	Median	Standard Deviation
up to 20 thous. (1)	3,39	3,00	0,88
up to 100 thous. (2)	3,75	4,00	0,65
> 100 thous. (3)	4,00	4,00	0,83
Total	3,67	4,00	0,79

Kruskal-Wallis Test:  $H=11.662$ ,  $p=0.003^{**}$ , R.I.: 1<2,3

Note:  $H$  – Kruskal-Wallis test value,  $p$  – the significance of the Kruskal-Wallis test (three levels of statistical significance were accepted:  $p<0.001$ , designated using  $^{***}$ ,  $p<0.01$ , marked with  $^{**}$ , and  $p<0.05$  described with  $^{*}$ ), R.I.- significant differences or which groups show statistically significant differences and what is the trend of this difference (< or >).

Source: authors' work.

The Kruskal-Wallis test has shown that the assessment of respondents from small cities of the usefulness of utilised consulting instruments was statistically significantly lower than those from medium-sized and large cities.

In summary, both methods of analysis indicate the presence of relations between the size of a city and the assessment of the usefulness of implemented consulting instruments, with that usefulness being rated significantly higher by representatives of larger cities.

The main benefits resulting from the utilisation of crowdsourcing for city management indicated by study responders include access to valuable information/ideas (87.5%), the possibility to become familiar with the attitudes and expectations of stakeholders (83.5%), opportunities for dialogue (78.4%) as well as strengthening of the feeling of being connected to a city (69%) and legitimisation of decisions (56.8%) (Figure 5).



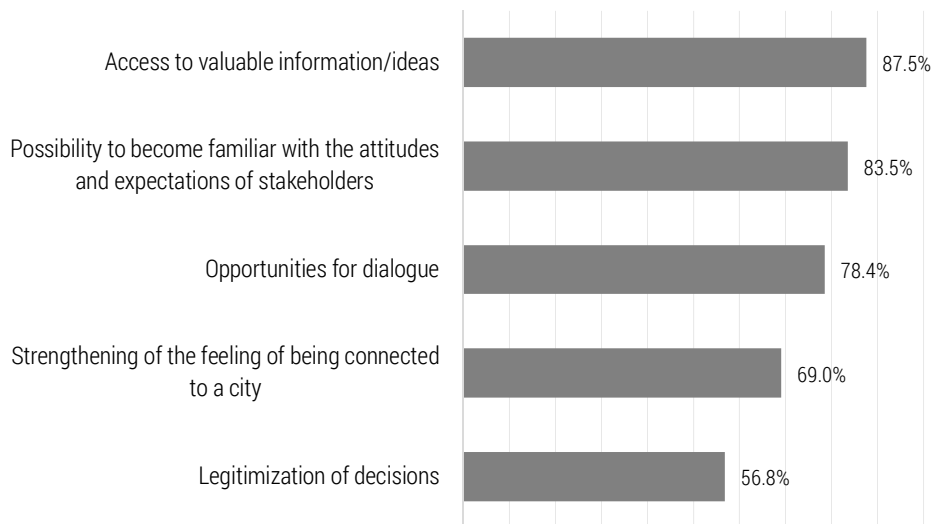


Figure 5. Types of benefits from involving stakeholders in city management by local governments (n=176)

Source: authors' work.

## Discussion

Within the last several years, it is possible to see the growing importance of the public's participation in discussions concerning the city within which they live. The sentiment that city inhabitants should be directly and regularly asked as to their opinion regarding matters related to their local communities is not something that has only been expressed by social organisations and urban movements but has also become an indisputable fact when it comes to municipal authorities and city hall servants (*Raport o stanie polskich miast*, 2019). Furthermore, it is promoted by developing new communication technologies, including social media, which undoubtedly facilitate e-participation (Khan & Krishnan, 2017) and realising related crowdsourcing initiatives (Linders, 2012).

The study that supports the present article has proven that Polish cities are willing to use crowdsourcing initiatives to consult stakeholders about issues concerning numerous areas of city functioning. The most often addressed regions that become a starting point for the realisation of crowdsourcing activities include culture, city image, spatial management, environmental protection, and waste management. Polish cities realise crowdsourcing initiatives such as security and public order, active recreation, tourism, relations between entrepreneurs and city hall, transport, and other local

innovations a bit less frequently. The involvement of local stakeholders to obtain more excellent knowledge within the areas identified above is generally unrelated to city size.

The results of our study essentially confirm those from previous research identifying areas in which crowdsourcing may be used to manage a city, including culture and tourism (Panagiotopoulou et al., 2018), city branding (Roudbari, 2018), spatial management (Puzdrakiewicz, 2015; Hajduk, 2020), sustainability (Certomà et al., 2015), environmental protection (Wazny, 2017), transport and mobility (Marzano et al., 2019) and innovation (Schuurman et al., 2012). The research completed for the needs of this article has allowed the identification of an additional area of city function in which stakeholders are involved through the utilisation of crowdsourcing initiatives, that of the cooperation between city hall and entrepreneurs. Our study has also shown that these types of industries are much more often realised in larger cities.

Research conducted by Hajduk (2020) of Polish local governments has shown that crowdsourcing initiatives were often utilised in preparing local spatial development plans. It has to be noted, however, that through the Act from March 27th, 2003, concerning the spatial planning and development, inhabitants of cities are assured a share in the procedure of accepting or changes to local spatial development plans and studies of conditions and directions of spatial development (*Raport o stanie polskich miast*, 2019).

Survey results have demonstrated that the primary forms of stakeholder involvement through crowdsourcing in city management include civic budgeting, voting/polls/surveys, and organising competitions for local communities. Although popular in cities of various sizes, civic budgeting is much more often utilised in towns with populations exceeding 100 thousand inhabitants and those up to 100 thousand people than in cities no greater than 20 thousand inhabitants. The larger the city, the more significant the percentage of respondents indicating the use of debates/discussions/meetings, workshops, and the submission of postulates and comments. Furthermore, the larger the city, the significantly more significant percentage of participants who declare the use of voting/polls/surveys and interviews. Obtained results confirm conclusions within the Report on the state of Polish cities (2019), according to which the inhabitants of large cities have the most significant opportunities to use various instruments of public participation. The most crucial percentage of municipal centres that passed civic budgets occurred among urban centres having populations exceeding 100 thousand people. Poland's small cities have not yet fully adapted to the standards of intelligent cities. When it comes to numerous small and medium-sized cities, there also exists the problem with low levels of civic dialogue (*Raport o stanie polskich miast*, 2019) being, in many cases, the effect of the limited knowledge of local

government employees regarding the needs and benefits resulting from the participation of the public in solving local problems.

Studies of the readiness of city inhabitants to implement intelligent city crowdsourcing services from the perspective of developing countries conducted by Staletić et al. (2020) on the example of the city of Belgrade in Serbia show that citizens are ready to accept mainly those crowdsourcing services which support the development of solar power and environmental protection as well as crowd voting and services connected to crowdsourcing that can improve the state of public transport.

Research results indicate that local government stakeholder involvement in city management often involves the city's official web page, social media, and unique platforms or websites dedicated to social consultations. Conducted statistical analyses have demonstrated that representatives of cities whose populations exceed 100 thousand inhabitants assess the importance of the city's web page as much higher than those whose citizens are below that number. Additionally, representatives of cities with more than 100 thousand inhabitants also rate the significance of unique platforms or internet pages devoted to social consultations higher than those from cities with less than 100 thousand inhabitants and those below 20 thousand residents.

Nearly 2/3 of survey participants assessed the usefulness of utilising crowdsourcing as a tool for stakeholders' involvement in a city's management as high. A statistically significant relationship between the assessment of the effectiveness of employing crowdsourcing and city size has been observed. Representatives of the largest cities see the use of crowdsourcing in city management as much more significant than those from medium-sized and small towns.

Nearly all respondents appreciate such benefits of employing crowdsourcing in city management as access to valuable information/ideas, the possibility to become familiar with the attitudes and expectations of stakeholders, or opportunities for dialogue. Other substantial advantages of this instrument include strengthening stakeholder identification with the city and legitimising decisions made by local governments are slightly less often indicated. The benefits seen by municipal government employees taking part in the survey are consistent with those strengths of crowdsourcing shown in the research of other authors (Papadopoulou & Giaoutzi, 2019). Liao et al. (2019) treat crowdsourcing as an innovative approach to information gathering and co-decision making. On the other hand, Mueller et al. (2018) see crowdsourcing as a source of knowledge regarding the needs and expectations of inhabitants concerning the city's development (especially in the process of urban planning). Trompette et al. (2008) stressed the role of crowdsourcing in developing collaboration and value creation as a way of setting up and organising the "collective brain". Schuurman et al. (2012) envisage

crowdsourcing initiatives as the source of ideas for innovative solutions for smart cities.

## Conclusions

Within the last several years, crowdsourcing has been enjoying a growth in interest from researchers and practitioners. It creates a broad and convenient plane for new scientific research since many aspects of this field have not gained widespread acceptance (starting with a lack of consensus regarding its definition and typology). In practice, it is becoming a vital participation management tool utilised more and more frequently by local governments (Glińska & Ilczuk, 2020).

Literary studies demonstrate that the potential of crowdsourcing still has not been fully utilised (Hossain & Kauranen, 2015). Research projects encompassing the experiences of cities in applying crowdsourcing to solve local problems thus far dealt solely with large cities (Koniagina et al., 2021; Stalatić et al., 2020). There still exists, however, a significant gap regarding studies concerning small and medium-sized cities, especially in developing countries.

Studies conducted to fulfil the needs of the present article provide a scientific contribution to the newly emerging literature dealing with crowdsourcing, stimulate discussion and facilitate the understanding of this process by demonstrating ways in which it can be utilised by municipal governments, including small and medium-sized cities (the theoretical substantiation of the use of crowdsourcing practices in city management).

The results of the survey carried out on a representative sample of city governments in Poland have proven that crowdsourcing initiatives in the practice of managing Polish cities concern such subject areas as culture, city image, spatial management, environmental protection, and waste management, as well as, a little less frequently, public order, active recreation and tourism and the relations between entrepreneurs and city hall, transport and local innovation. The involvement of local stakeholders to gain a more excellent knowledge of the areas identified above is, in principle, not dependent on city size. The primary forms of involving stakeholders in city management through crowdsourcing include civic budgets, voting/polls/surveys, interviews, debates/discussions/meetings, workshops, postulates, and comments. The frequency with which these forms are employed depends on the size of a given city. The larger the city, the more often its representatives utilise these forms of crowdsourcing. In involving stakeholders in the management of a town, local governments often use official city web pages, social media, and special platforms or internet pages dedicated to social consulta-

tion. In larger cities, the official city web page and special platforms devoted to social talks are much more significant than in smaller towns. Most municipal government representatives rate the use of crowdsourcing in city management highly. Representatives of the largest cities value the service of crowdsourcing in city management much more than the inhabitants of medium and small towns. The main benefits of using crowdsourcing in city management seen by representatives of urban governments include access to valuable information/ideas, the possibility to become familiar with the attitudes and expectations of stakeholders, and opportunities for dialogue.

The practical implications of study results may aid the decision-making process of territorial authorities concerning the engagement of local stakeholders in solving city problems, especially concerning choosing desirable forms of crowdsourcing. The results should help public administrations to strengthen relations with stakeholders. The research can become a valuable indicator, especially when it comes to small cities (in which crowdsourcing activities are less common), in how to increase the involvement of inhabitants in decision-making processes and increase awareness not only of municipal governments but also of city residents. By analysing practical solutions concerning the management of Polish cities, these studies support initiatives for developing smart cities. The present work is an answer to the appeal contained within the Report on the state of Polish cities (*Raport o stanie polskich miast*, 2019), according to which it is necessary to initiate activities aimed at equalising the quality of civic dialogue within the smallest entities thanks to which the residents of various sized cities will have equal opportunities to influence local matters.

Studies completed for the needs of the present work are characterised by several limitations, such as not having a vast research sample, the research having been carried out in Poland, where the tradition of the functioning of municipal governments is shorter than that of other countries in Europe as well as the fact that the research was carried out in only one country. Similar studies in other countries would allow the better identification of differences in the utilisation level of crowdsourcing initiatives in city management.

In considering the direction of future research into crowdsourcing related to the perspective of public organisations, including local governments, it is necessary to mention the need to study the opinions of various groups of stakeholders. Studies into the ideas regarding crowdsourcing of other stakeholder groups, especially inhabitants of cities or representatives of business, are also needed. An important direction of research into urban crowdsourcing is the evaluation of participation processes carried out in municipal governments (*Raport o stanie polskich miast*, 2019).

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## The contribution of the authors

Ewa Glińska: Conceptualization, Methodology, Writing – Original Draft, Writing – Review & Editing, Supervision.

Halina Kiryluk: Conceptualization, Methodology, Writing – Original Draft, Writing – Review & Editing.

Karolina Ilczuk: Conceptualization, Methodology, Investigation, Data Curation, Visualization, Writing – Original Draft.

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