

Website as a Tool of Local E-Governance in Czechia: Which CMS is the Most Popular in the Moravian-Silesian Region?

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Abstract. If e-governance can be considered as a way for local governments to provide citizens and other subjects with the fastest and most accurate information possible, while simultaneously involving them in public affairs, websites appear to be the best tool for this form of governance. To create and manage these websites, it is necessary to use an effective content-management system, CMS. The aim of this paper is to ascertain the most commonly used types of CMS for the creation of municipal websites in the Moravian-Silesian Region and to determine whether the use of a particular type of CMS can be related to the size of the municipality according to its specific needs and financial possibilities. It was discovered that almost two-thirds of municipalities use commercial systems developed by Czech companies. Further, it was found that of the size a given type of system depends upon the size of the municipality, in the sense of a more frequent use of custom systems as municipalities increase in size.

Keywords: Content Management System · E-Governance · Moravian-Silesian Region · Municipalities · Websites

1 Introduction

Local governments are mandated to build more powerful and engaged communities. The Internet is dramatically changing the way that governments serve their citizens and ensuring the municipal website is accessible to all citizens must be a top priority on the public digital marketing to-do list [1]. Websites are often the first and primary source of information that citizens use to make life easier and increase their awareness and involvement. Municipalities view every interaction with the Web as an opportunity to learn how to better serve their citizens (and another entities) digitally. Thus, they create websites that are initially used to publish governmental information for citizens (and another entities), enabling them to carry out various online transactions directly related to them and later with third-party organizations from the local community, as well as facilitating their involvement in decision-making or public service processes [2].

As the number of citizens (and others) using the internet and mobile technologies increases, the public sector is constantly innovating to keep pace with these changing

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technologies and all entities' expectations [3]. So, access to information through systems such as the internet and municipal websites has a very important role to play in ensuring the health of good governance [4].

Good local websites should be constantly updated, as well as properly-organized, content-rich, and easily searchable. Based on using a proper and flexible Content Management System (CMS), when choosing a CMS that best suits local government, there are three possibilities: paid Commercial CMS, a free Open Source CMS and a custom designed CMS that combines both free and paid variants, depending on the objectives of the municipality.

In a majority of municipalities, Open Source CMS prevails, followed by Custom CMS [5]. In the case of Open Source CMS, WordPress is generally the most used system, followed by Drupal and Joomla. According to an analysis of existing studies, is similar in various countries [6–9].

These results are also confirmed in the municipalities of the Moravian-Silesian Region in the Czech Republic. To confirm this fact, a survey was conducted in all three hundred municipalities of this region, in which two research questions were set: 1) Do municipalities in the Moravian-Silesian Region use Open Source CMS on a scale similar to municipalities in other countries? 2) Is the use of a given CMS dependent on the size of the municipality due to their different needs and budgets and can we suppose that the smaller municipalities are using the open source possibilities more than the larger cities?

Thus, the authors of this paper set the aim of their research to determine the most-used CMS for website creation in 300 municipalities across the Moravian-Silesian Region. Both statutory cities, cities, townships and smaller municipalities were analyzed. Thereafter, they determined whether the use of particular types of CMS were related to the size of the municipality, based on a certain type of CSM being more suitable for larger or smaller municipalities.

The motivation for this paper was to clarify whether local Moravian-Silesian governments copy the trend of using open source systems to create their websites like their 'colleagues' abroad or choose other strategies. A second reason was mainly based on the assumption that the financial budgets of municipalities are limited and depend on their size. This can also influence the choice of systems for websites and we find it inspiring (mainly for local governments) to determine whether it is possible to distinguish CMS according to the size of the municipality. These types of studies have not yet been carried out in the Czech Republic and could help optimize the e-services offered to citizens and other economic entities when choosing the most suitable CMS.

This paper is organized as follows. Section Two describes the state of knowledge in the area of the local e-governance in relation to municipal websites. The tool used for creating websites in the form of various CMS systems for public administration is described in Section Three. Section Four is devoted to a brief presentation of the Moravian-Silesian region, its municipalities and problem solving capabilities. Section Five presents the overall results and Section Six contains a conclusion.

2 Literature Review

The internet has only been available to the public for about the last three decades, but has already drastically changed the world. Online services continue to shape the landscape for how people communicate and how information is transferred. Accessing different websites is now a primary way people get their news, check their bank accounts, talk to friends, and much more. Today, there are nearly two billion websites online, with thousands that belong to different government agencies and organizations.

Governments created their own websites as powerful channels for communication and to provide services and miscellaneous other information to public access. As Nicholls [10] claims, since the beginning of the web, there has been a great deal of enthusiasm over the possibilities for digital government, using the internet as a tool for improving public service performance. From the late 1990s onwards, governments have extensively touted the benefits of, and encouraged spending on, web programs at both local and national levels.

As the internet grows, government websites are increasingly used to present public sector information [11]. The emergence of e-government platforms enabled governments to develop and implement environments where diverse interested parties can obtain and request information, conduct operations, and access government services [12]. They comprise a way for governments to use the most innovative information and communication technologies, particularly web-based internet applications, to provide citizens and businesses with more convenient access to government information and services, as well as improve the quality of their services and provide greater opportunities to participate in democratic institutions and processes. These processes are characterized as e-governance [13].

Early researchers described the development of government websites as a series of stages [14, 15]. In the 21st century, globalization is creating offers of interactive initiatives and demands that put governments worldwide under pressure to change and innovate the way in which their bureaucracies relate to citizens [16]. Website progression has been rapid in the public sector, especially in terms of functionality and performance. Public sector websites have sought to go beyond the static dissemination of contact information [17]. Similarly, Huang [18] claims that with the growth of the internet, governmental public service models are gradually changing from traditional manual methods to online e-government websites.

Even so, the purpose of a (local) government website is a bit different from most other sites. It encourages transformation to the ‘e-government’ paradigm, which emphasizes coordinated network-building, external collaboration and customer services. Websites of municipalities are among the most crucial tools they have for meeting the needs of citizens and connecting with their local community. Thus, it is very important to have an effective government website [19].

According to Piotrowski [20], government websites are quickly becoming the first point of contact for citizens and visitors seeking information. Local government website content is key with regard to transparency. One of the most prominent ways in which governments release information is through their websites. First, governments are increasingly turning to the internet to better their service capabilities. Second, citizens are coming to expect their government to have a presence online.

As e-governance is a tool or application that functions as government information technology [21], official websites are its core instrument: the changes in the quality of municipal websites reflects the changes in its development [22]. The official website is one of the most popular and financially feasible tools for developing e-governance [23], is considered a vital element of any successful e-governance strategy [24] and serves the public as heterogeneous groups of citizens with varied personal attributes, needs, and interests [25]. Through the use of an e-governance system, local authorities are able to provide online services conveniently through the use of modern ICTs, bring services closer to the people, improve communications between local authorities and citizens, reduce local authority operating expenses and be more transparent and accountable for the manner in which they provide services to the public [4].

According to Neves and Silva [26], government websites are an effective tool for increasing information delivery, user interaction, and government services, being the most visible aspects for citizens concerning public management. The implementation of electronic administration aims at simplifying and improving the relationships and transactions between public organizations, their users and citizens [27].

The (local) government is required to take advantage of advances in ICT through the development of e-government to improve the ability to process and distribute, providing quality information and services to the public [28]. Similarly, Yunita [29] claims, the website is one form of effective information technology development in publications and the website is a means for the public to access information.

Through its website, local government can provide services according to the needs of the community and completeness of service information must be considered by the government [30]. Moreover, websites are arguably the most easily accessible, credible and durable form of internet-enabled technology to provide government information in a timely manner [31].

Lastly, websites provide information concerning how public policies shape the lives of local residents, and how local residents can engage with government to shape public policy [32].

3 Content Management Systems Used for Municipal Websites

Quality public websites are not only constantly updated, but also well-organized, content-rich, and easily searchable. This is based on using a proper and flexible Content Management System (CMS). It represents one of the most powerful online content management tools today, by allowing the creation of a web page in a short time, control who has access to information and who creates, alters, and stores content on the platform [6]. Specifically, in public administration, content management promotes a substantial increase in flexibility through remote and updated network access, as well as more selective control of which metadata should be used to steer information correctly, as well as rules that regulate access, search possibilities, and the integration of different information systems [33].

In addition to the above mentioned advantages that CMS offers and to which we can add the low costs and simple updating in the case of self-management or mobile ready access, there are also some disadvantages. We can assign to them: security risk (unless

the system is maintained and updated, could be hacked), need for skilled IT specialist (if the system needs to be maintained and updated regularly), users are dependent on plugins and widgets (for most of their functionalities) with the hidden costs and limitations of users´ number and functionalities.

The most-used CMS in the world is WordPress, with a market share of 63.4% [34]. WordPress is used on a third of websites on the internet. Shopify is second (5.5%), followed by Wix (3.7%) and Squarespace (3.1%). The market leader until WordPress came along was Joomla, then occupying second place until 2020 and now in fifth place with a share of about 2.7%. Other positions within the CMS market are Drupal (1.9%), Adobe Systems (1.6%), Google Systems (1.5%) and Bitrix (1.2%).

In public administration, WordPress is used by the official Swedish website as well as by the White House. Joomla is a key CSM tool for the design of municipal websites of several regions in Latin America, e. g. the municipalities of Patzún (Guatemela), David or San Miguelito (Panama) [35]. According to Digital.gov [36], the most used CMS for government agencies in the U.S. are Drupal, Plone and WordPress. In Portugal, Joomla, Drupal and WordPress are the most used systems in public administration [5].

Table 1 shows the ratio of the most popular CMS in selected European countries. The colored areas indicate the most used/popular CMS in particular countries. According to CMScensus [37], in Germany the CMS TYPO3 is most popular, but the difference between this CMS and WordPress is very small, only 3.5 percentage points. WordPress is the most used CMS in Hungary, while Joomla is very close to it – the difference is only 1%.

But as Csontos and Heckl [9] claim, it was very difficult to determine which CMS local governments used, as only 8 were found from the 25 analyzed, leaving 68% unknown. On the contrary, Joomla was used in more than half of municipalities in Italy [8]. The second most popular CMS is OpenCMS, distancing itself by 43 percent from Joomla.

Briggs [7] analyzed 233 local governments in the UK and found that the difference among the first three CMS is not so big. The most popular, JADU, is used by 62 municipalities, Drupal was second, by 60 municipalities and Umbraco was selected by 58 local governments. World Press and Joomla were used by only 14, respectively 7 municipality websites.

Table 1. The Most Used CMS for Municipalities´ Websites in Selected Countries (%).

Country	WordPress	Joomla	Drupal	Umbraco	Others	NF/low
Germany	15.5	7.0	0.5	1.2	19.0 (TYPO3)	41
Hungary	12.0	11.0	8.0	--	--	68
Italy	9.0	57.9	10.1	--	14.6 (OCMS)	*
UK	6.0	2.2	19.0	17.0	20.0 (JADU)	**

Note: NF - not found, * the rest CMS with low ratio 8.3, ** the rest of CMS with low ratio 35.8

4 Problem Solving

To ascertain the tools and technologies that are used for the creation of official websites of municipalities in the Moravian-Silesian Region, the research was carried out during three months from January to March, 2023 and was aimed at examining individual websites of all three hundred municipalities.

4.1 The Study Area

The Moravian-Silesian Region is one of 14 administrative regions of the Czech Republic. The region is defined by the six districts of Bruntál, Frýdek-Místek, Karviná, Nový Jičín, Opava and Ostrava-město, further divided into 22 administrative districts of municipalities with extended remit, which include a total of 300 municipalities. With its area of 5,431 km^2, it occupies 6.9% of the entire territory of the Czech Republic and is thus ranked 6th among all regions. The location of the Moravian-Silesian region is shown in Fig. 1.



Fig. 1. Location of Moravian-Silesian Region in the Czech Republic

With 1,178 thousand inhabitants, the Moravian-Silesian Region is the third most populous in the Czech Republic (in 2009 it was the first one), but with its 300 municipalities it is one of the regions with the smallest number of settlements. The size of the municipalities in this region is diverse. As shown in Table 1, more than half of them (57.3%) are rural municipalities, 23% are small municipalities and cities form 17.7% of

all municipalities. Statutory cities and the regional center (Ostrava) represent only 2% of all municipalities (Table 2).

Table 2. Definition of Municipalities According to their Size and Numbers (2022).

Number of citizens	Definition of municipality	Number of municipalities
1–500	Small municipalities	69
501–3,000	Rural municipalities	172
3,001–30,000	Cities	53
30,001–70,000	Statutory cities	5
279,791	Regional capital (Ostrava)	1

4.2 Content Management System of Municipalities in the Moravian-Silesian Region

Each municipality in the Moravian-Silesian region creates its own website, through which it informs and provides its e-services to all local and external entities. The websites of municipalities have undergone a major transformation over the last decade, with most of the websites currently being created using specialized content management systems focused directly on public administration.

In the past, frequently used tools for creating sites of cities and towns included general content management systems that were freely distributable and free of charge, such as WordPress, Joomla or Drupal. As was mentioned, these CMS were (and still are) the most used in many institutions of public administration or local governments around the world.

In view of the above, it was the intention of the authors of this paper to ascertain whether the above-mentioned CMS are also the most frequently used systems of Moravian-Silesian municipalities (determination of question Q1). In addition, they also tried to ascertain whether the size of the municipality, based on their different needs and financial possibilities, has an effect on the use of different types of CMS (determination of question Q2).

On the basis of the set objectives, research was carried out on all three hundred websites of the municipalities. The first step taken was to enter the name of the municipality in an internet search engine, e.g. karvina.cz. The second step was to find the CMS of the website. Information about the technology used to create the website can often be found in the 'footer' of the website, as shown in Fig. 2. Sometimes, it was necessary to try to find the technology used to create the website directly in the source code. This was mostly the case of Joomla and WordPress.

The data obtained were collected and processed. Results of the survey are presented in the following section of the paper.

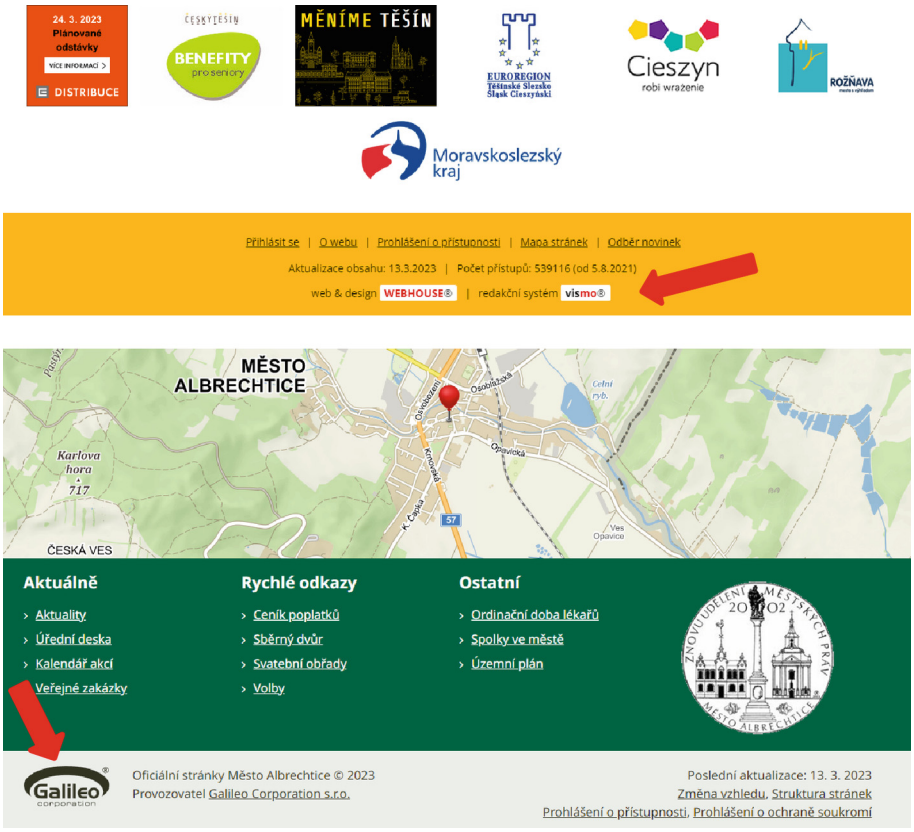

Fig. 2. The Case of Websites in Český Těšín (above) and Albrechtice (below).

5 Results of Survey

First of all, it should be noted that the use of CMS for the municipality websites has changed in recent years. While in the past decade it was common that their official websites were using opensource free content management systems such as WordPress, Joomla or Drupal, now these municipalities have moved to use commercial CMS such as GSM (developed by Galileo), Vismo (developed by Webhouse) or IPO (developed by Antee).

Based on research of individual websites of municipalities in the region, we concluded that 214 municipalities out of a total of 300 used one of the three most important editorial systems for their purposes, which is a total market share of 71.33%. The detailed statistic can be seen in the following Table 3.

The best-selling editorial system, GCM (Galileo Content Manager), is provided by GALILEO CORPORATION (https://www.igalileo.cz/). This system is basically very simple and clear for the purposes of managing official websites of municipalities. This system has a dominant position within the creation of websites of towns and municipalities in the Moravian-Silesian Region with almost half market share. According

Table 3. Commercial CMS for Creating Municipalities' Websites.

CMS	Link	Number of municipalities´ websites	Market share
GCM	https://www.igalileo.cz/	140	46.67%
VISMO	https://vismo.cz/	39	13.00%
IPO	https://www.antee.cz/	35	11.67%

to information from the company's official website, the firm already has more than 5,000 customers from municipalities, towns, schools and contributory organizations throughout the Czech and Slovak Republics.

The second strongest player on the market within the region is a content management system called VISMO of company WEBHOUSE (https://vismo.cz/). This CMS is used by substantially fewer municipalities and its share is a quarter compared to GMS in the Moravian-Silesian Region. Editing a website using the vismo Online editing system is very easy because you don't need to know how to program. It applies the principle "WYSIWYG" (what you see is what you get), the website can be edited directly in place, rather than in an administration environment.

The third most used content management system for creating websites of municipalities in the Moravian-Silesian region is the IPO system from company ANTEE (https://www.antee.cz/). This system has only slightly less market share than vismo (by 1 percentage point) in the Moravian-Silesian Region. Content management system IPO is a very practical web management tool. It is possible to easily manage municipal sites through the IPO editorial system, which undergoes regular updates.

Based on research of analysing individual websites of towns and municipalities in the region, we concluded that only 18 municipalities out of a total of 300 use one of the two most used open source content management systems worldwide. Thus, WordPress and Joomla, whose total market share is only 6%. The statistics are shown in Table 4.

Table 4. Table: Open Source CMS for Creating Municipalities' Websites

CMS	Link	Number of municipalities´ websites	Market Share
WordPress	https://wordpress.org/	10	3.33%
Joomla	https://www.joomla.org/	8	2.67%

Based on the above, it can be seen that these free open source systems have already been almost completely replaced in the Moravian-Silesian Region by commercial editorial systems specializing in creating websites for public administration purposes. These commercial systems such as GCM, VISMO or IPO have the undeniable advantage of being run in the cloud in the form of software as a service, so that cities and municipalities need not run them on their own servers. Moreover, these systems fully comply with the requirements for information content of municipalities.

Specialized commercial content management systems, together with general free of charge content management systems, have a market share of 77.34% for creating municipalities' websites in the Moravian-Silesian Region. There is still market share of 22.66% available for other possibilities of creating municipal websites. When we analyzed the websites of municipalities, we found that this segment is made up of more than 40 different smaller companies or individuals involved in creating websites. However, none of these entities has a market share greater than 1.5%.

After dealing with the issue of not/using the given systems, we can focus on the analysis of the results related to question 2 (Q2). That is, whether there is a dependence between the size of the municipality and the CMS used. It can be assumed that the financial conditions of smaller municipalities force them to save in certain ways and therefore use a free open source CMS or the types of CMS that are universal and, in some ways, cheaper. The results of that dependency are shown in Table 5. The biggest city, regional capital Ostrava, is not mentioned because is only one (and uses another CMS).

Table 5. The Relationship between the Size of the Municipality and the Type of CMS.

CMS	SM	RM	C	SC
GMS	34	81	25	-
VISMO	10	17	11	1
IPO	8	26	-	-
WordPress	3	5	1	1
Joomla	4	4	-	-
Others	10	39	16	3

Note: SM – Small Municipalities (1–500 citizens); RM – Rural Municipalities (500–3,000 citizens); C – cities (3,000–30,000 citizens); SC – Statutory Cities (30,000–70,000 citizens)

Unsurprisingly, we see a big difference between the use of open sources and commercial CMS. However, absolute numbers do not have much informative value, it is necessary to convert them into relative numbers – ratios and best to visualize them. Therefore, to answer the second question, pie charts were created (see Fig. 3), according to the size of the given municipalities in the Moravian-Silesian region.

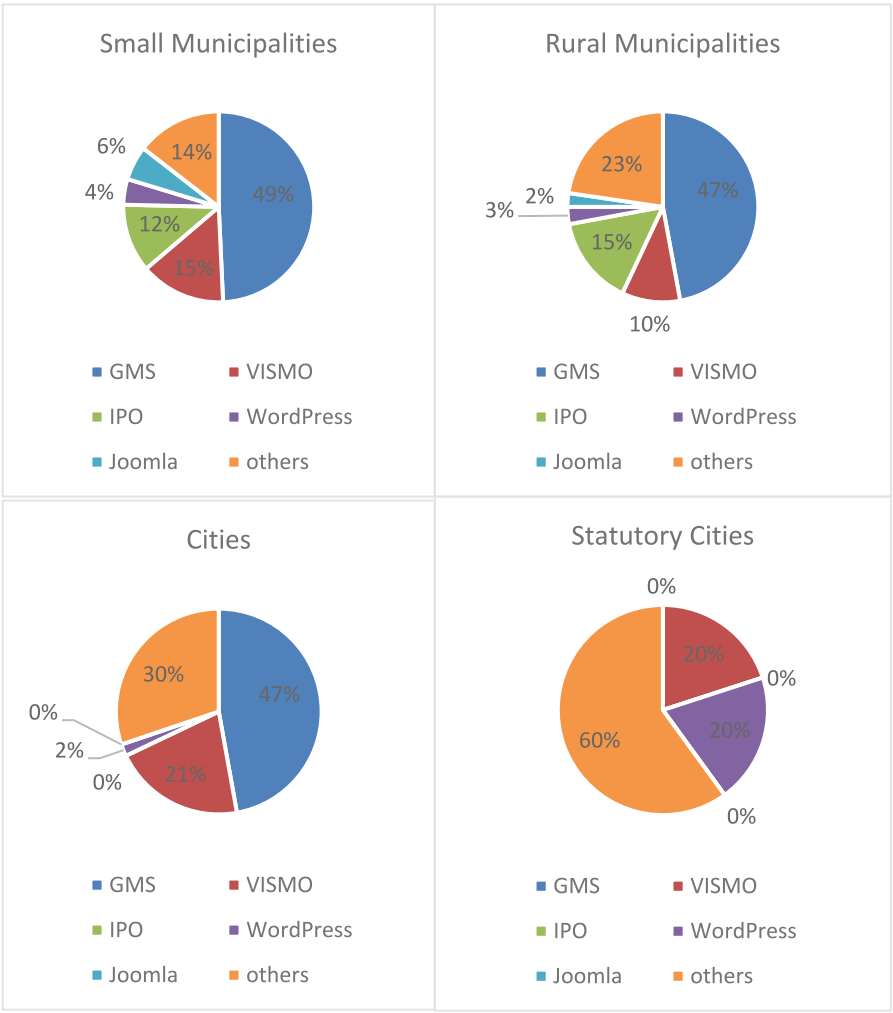

Fig. 3. Visualization of relationship between the Sites of Municipalities and Types of CMS.

6 Conclusions and Discussion

The primary tool for e-governance is the website, whether at the governmental, regional or local level. It can be an official noticeboard, a regional information portal, or an e-administration platform if sufficiently sophisticated [38]. In any case, citizens satisfaction is one of the most important objectives of any e-governance strategy [39]. Clear and transparent websites, providing a large volume of information and e-services, are the basis for choosing a suitable Content Management System. The type of CMS used and its possible dependence on the size of the municipality were the subject of interest of this paper. Thus, two research questions were established: 1) Do municipalities in the Moravian-Silesian Region use Open Source CMS on a scale similar to municipalities in

other countries? 2) Is the use of a given CMS dependent on the size of the municipality due to their different needs and budgets and can we suppose that the smaller municipalities are using the open source possibilities more than the larger cities?

Based on the results of a survey conducted among all municipalities of the Moravian-Silesian region, question number one regarding the use of the same types of CMS widespread in the surrounding world can be answered in the negative. Common open source CMS is used by only a small number of municipalities (6%), namely WordPress and Joomla, while other systems such as Drupal or Plone are not used by Moravian-Silesian municipalities at all (or this was not detected).

Almost two-thirds of municipalities use Czech commercial CMS, such as GMS, VISMO and IPO. Less than a third of the municipalities (22.7%) use other CMS, whose individual share in the total use is negligible. If municipalities can afford to use commercial systems, is there any influence of the size of the municipality on the choice of a given system? This issue was thus further analyzed within the framework of question two.

Question two (and subsequently the answer to it) must be analyzed from two perspectives. First, the municipalities of the Moravian-Silesian region use very little free open source CMS, while the Joomla system is used most in small municipalities, but its share is minimal. Larger cities do not use this system at all. The use of WordPress is similar, used by about 5% of small and rural municipalities, with the exception being a group of statutory cities. Here, however, it is necessary to remember that there are only 5 of these cities in the region, therefore one city that uses CMS WordPress makes up 20% of their total number.

Secondly, there is a high share of commercial CMS (GMS, IPO and VISMO) in the group of small municipalities, which decreases with the increase in the size of municipalities. The exception here is VISMO, whose share across the cross-section of municipalities is more or less stable. What is clear, however, is the growing share of CMSs, included in the 'others' group. In other words, CMSs that are tailor-made for cities (so called Custom CMS). Their share rises from 10% in the group of small municipalities to 60% in the group of statutory cities (and 100% in the case of Regional capital, but this city is only one). It is therefore very likely that larger cities can afford to run websites with higher budgets than smaller municipalities, and therefore the answer to question number two is that there is a relationship between the size of the municipality and the CMS system used in terms of its financial demands.

We can add one more interesting remark to the results: according to our findings, not all websites of municipalities in the Moravian-Silesian region have foreign language mutations (and it does not matter the size of the municipality), so they can only serve Czech (at most Slovak) users. This may be a challenge for their operators to change in the future.

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