INFORMATION SYSTEMS, SOFTWARE DEVELOPMENT, INTERNET TECHNOLOGIES AND SOCIAL NETWORKING SESSION

THE USE OF ICT DURING THE COVID-19 PANDEMIC IN THE CITY OF BELGRADE

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Abstract:

The current situation with the COVID-19 pandemic has indicated the need to use modern ICT to manage different systems. Local self-governments are forced to implement various measures to combat the pandemic and prevent the growth of the number of infected people. Moreover, the activities carried out by local self-governments often change and this is one of the reasons why efficient and effective information management has been imposed as one of the primary goals. The use of ICT has greatly facilitated the monitoring of the several parameters that affect efficiency in the combating current COVID-19 pandemic.

At the level of local self-governments, various entities are engaged during the COVID-19 pandemic. Therefore, coordination must be at a high level to implement various measures and achieve the desired results. Hospitals and other medical institutions, police, army forces, utility companies, Red Cross, volunteer organizations are some of the engaged institutions and organizations during pandemic.

This paper is the report one and direct contribution of this paper is to point out the way ICT is used by the city of Belgrade, as a local self-government, during COVID-19 pandemic. In addition to all the above listed institutions and organizations, local self-governments in the Republic of Serbia have the task of coordinating the entities at the local level through their headquarters for emergency management. The primary results of the paper are to focus on positive aspects of the use of ICT at the local level during COVID-19 pandemic, primarily in the area of easier and efficient coordination with citizens and institutions. In addition, the paper presents the weaknesses of the use of ICT some of which are the unavailability of such technologies in rural areas, different approaches to the use of ICT and the need to control access.

Keywords:

disaster management, headquarters for emergency management, information management, infodemic, coordination.

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INTRODUCTION

A new coronavirus infection named coronavirus disease (COVID-19) was discovered in Wuhan, China at the end of 2019, and has rapidly progressed. The World Health Organization (WHO) declared COVID-19 a pandemic in March 2020. COVID-19 pandemic was characterized by the rapidity of the outbreak that was accelerated by transportation networks worldwide. Researchers have attempted various approaches to manage COVID-19 pandemic, such as genome analyses, diagnostic methods,

treatments, and prevention. An 'infodemic' situation has developed, whereby misinformation has caused logistical disruptions and resulted in health hazards and shortages of supplies [1].

During this situation, it was necessary to apply adequate management tools. Namely, the decisions had to be made quickly, bearing in mind that the conditions in which the pandemic took place were constantly changing.

The primary goals related to the protection of human lives had to be met in the conditions of a global pandemic that threatened to provoke a new economic crisis. Situation control depended on the speed of processing available data and creating information that would serve everyone to better protect and preserve their own and others' lives.

A crisis is defined as the social changes which changes the characteristics of a society [2]. Crisis management involves the coordination of activities by different groups in an effort to avoid or minimize disaster impact. Nowadays, crisis management is not able to operate efficiently without the support of the state of the art ICT. In order to find an optimal operation model in crisis management it becomes more frequent to take the advantage of various technological innovations (e.g. trusted computing and agent-based infrastructure) or organisational solutions (e.g. cloud computing) [3]. In accordance with the previous definitions, COVID-19 pandemic can be viewed as a crisis during which it is necessary to apply the postulates of crisis management with the use of modern ICT.

The use of modern ICT has proven to be more than a useful tool during the COVID-19 pandemic. Processing data on the number of infected, monitoring the number of people in hospital and other types of treatment, the movement of the number of deceased, the need for medical and other protective equipment, indicated that only through ICT can monitor certain parameters and further assist state and local leadership to make timely and efficient decisions. The city of Belgrade as the capital of the Republic of Serbia faced big problems at the start of the pandemic. However, difficulties in functioning were visible and later in line with changes in the epidemiological situation. It happened that in a short period, the city authorities had to change the way they worked and to define the time and way of work of other companies and legal entities. However, the use of modern information and communication technologies has significantly facilitated the management of the city of Belgrade in the conditions of a COVID-19 pandemic.

2. USE OF ICT DURING A CRISIS

The COVID-19 pandemic is a global phenomenon. In this regard, local and national authorities have used various forms of ICT to facilitate the fight against the disease. Before giving some examples of use of ICT during COVID–19 pandemic as a crisis, the use of other forms of crisis situations caused by natural or manmade disasters will also be pointed out.

ICT can be used support the practice of disaster risk management (DRM) in times of crisis, as well as in times of planning and in times of reconstruction. The revolutionary potential of ICT lies in their ability to instantaneously connect vast networks of individuals and organizations across great geographic distances, and to facilitate fast flows of information, capital, ideas, people and products. ICT have become essential tools for cooperation and collaboration [4]. ICT should be used during earthquakes, floods, fires, forest fires, etc.

The tracking of patients and their contacts is imperative to public health in the fight against infectious diseases. Johns Hopkins University Department of Public Health, Baltimore, Maryland, USA, developed an interactive geographical information service (GIS) that was developed using ArcGIS (Esri, Redlands, California, USA) to display the number of confirmed cases of and deaths caused by COVID-19 pandemic on a map [5]. GIS is a very useful tool that is used in other areas as well, such as emergency management. Probably the most important and complex phase of emergency management in response. During this phase, responsible emergency institutions have a wide range of tasks to save and rescue people and protect environmental and heritage values. So, coordination is very important as it provides instructions on how to use resources most effectively [6]. As well as the response to the pandemic can be viewed as a response phase in emergency management with the basic goal of protecting and saving human lives, it is clear why GIS was used as a software and information tool.

It has also been reported that machine learning of medical images, such as chest radiographs and CT scans, can be used to accurately diagnose COVID-19-associated pneumonia [7]. Much of the available data related to COVID-19 pandemic are open access, and machine learning models to support clinical decision-making have made use of such data. The creation of electronic clinical guidelines has also been reported, whereby implemented data sets have aided the diagnosis and treatment of COVID-19 pandemic [8].

The use of tell meeting and teleworking systems using ICT became popular because of the many regional lockdowns that acted as a countermeasure to the pandemic. Various medical conferences have been held as teleconferences using video calling technologies, which has contributed to the spread of the latest medical information, including the latest developments in COVID-19 pandemic research [9]. Telemedicine is a very useful information tool in the current pandemic. The appearance of the COVID-19 pandemic was a total unknown to the medical staff. In that way, and in the conditions of limited movement, both at the national and international level, it was necessary to exchange opinions and results that were reached through telemedicine. The main goal was to raise the level of healing of people through telemedicine and save human lives. Telemedicine is not a new information communication tool. But during the pandemic, it showed several advantages and possibilities that should be used in other conditions as well.

Digital contact tracing was suggested as a means to help control COVID-19 transmission following both real-world experiences in Singapore and mathematical models [10]. To counter COVID-19-related misinformation, the WHO and other health organizations of many countries have ensured that accurate information is published. They have also blocked misinformation shared on social media and guided public information. Social media platforms also banned many accounts that propagated conspiracies related to COVID-19 pandemic. The role of social networks is significant during COVID-19 pandemic. Both the positive and negative sides of social networks have been shown. The positive side is, in essence, that information, instructions and epidemiological measures could spread quickly among citizens, especially bearing in mind that there were daily changes. On the other hand, the negative circumstances of the use of social networks during the pandemic show that rumors and inaccurate information were often spread, which led to the creation of panic among the population.

3. THE EXAMPLE OF THE CITY OF BELGRADE FOR USE OF ICT DURING THE COVID 19 PANDEMIC

The city of Belgrade has been improving electronic services for years. Since 2016, the Secretariat for defense, emergency management, communication, and coordination of relations with citizens has had the Beokom service for mobile phones. Through this application,

our citizens of Belgrade electronically report communal problems, receive important information for life in the city - service information about works in the city, changes in traffic, breakdowns. Also, the BG portal is operational, a site where citizens have the same opportunities provided by the Beokom service application, as well as some additional opportunities [11]. Further improvement of these services is planned.

The Belgrade Call Center also works at the Secretariat for defense, emergency management, communication, and coordination of relations with citizens, through which citizens can get all important information for life in the city, and since January this year, call centers have been operating in all 17 Belgrade municipalities, which are made available to the city headquarters for emergency management, and through which citizens of Belgrade are offered assistance in applying for vaccination and transportation to the place where it is performed, as well as assistance in applying for vaccination on the e-Government portal. In this way, the city of Belgrade helps the Ministry of Health so that all citizens of Belgrade who want to be vaccinated do so.

In the period that has followed us, the city of Belgrade has taken several steps to implement and improve electronic services, which have made life easier for citizens and functioning in times of an emergency, caused by the epidemic of the COVID-19 pandemic. During 2020, as in 2021, the city headquarters for emergency management made decisions (orders, conclusions, recommendations) at sessions held electronically. Last year, 102 sessions of the city headquarters were held, of which 101 sessions were electronic, and one was regular. This year, the city headquarters had 34 sessions and all were held electronically. The commander of the city headquarters for emergency management is the mayor. The deputy commander of the city headquarters for emergency management is the deputy mayor or a member of the city council. The city headquarters for emergency management performs the following tasks: puts on standby and engages entities of special importance for protection and rescue in local self-governments; orders the emergency headquarters of city municipalities to take measures and activities for protection and rescue if the headquarters of the city municipality does not make timely and appropriate decisions; order the use of the forces of the system of disaster risk reduction and emergency management, means of assistance and other means used in emergencies; engages entities of special importance [12]. It is obvious that even though the legal determination of the competencies of the work of the

Belgrade city headquarters for emergency management, it was necessary to hold regular sessions of the head-quarters and make timely and efficient decisions under the conditions of the COVID-19 pandemic. The use of ICT made it possible to hold regular electronic sessions to prevent the spread of infection among management and staff members of the Belgrade city headquarters for emergency management.

The digital green certificate is a consolidated certificate proving whether you have received the COVID-19 vaccine and whether you have SARS-CoV-2 infectious disease test results. Also, this certificate contains the results of the following tests:

- PCR test (SARS-CoV-2 RT real-time PCR)
- Antigen Test (SARS-CoV-2 Ag-RTD Antigen Rapid Detection Test)
- Serological test (SARS-CoV-2 RBD S-Protein Immunoglobulin G (IgG) Test)

The digital green certificate is a certificate that is electronically stamped and as such cannot be falsified or misused. On 17 March 2021, the European Commission presented a proposal to create a digital green certificate to facilitate the safe free movement of citizens within the EU during the COVID-19 pandemic. Digital green certificates will be valid in all EU Member States. Key features of the certificate: digital and/or paper format; with QR code; free of charge; in national language and English; safe and secure; valid in all EU countries. National authorities are in charge of issuing the certificate. It could, for example, be issued by hospitals, test centers, health authorities. The digital version can be stored on a mobile device. Citizens can also request a paper version. Both will have a QR code that contains essential information, as well as a digital seal to make sure the certificate is authentic. The Digital Green Certificate contains necessary key information such as name, date of birth, date of issuance, relevant information about vaccine/test/recovery and, a unique identifier. The certificates will only include a limited set of information that is necessary. This cannot be retained by visited countries. For verification purposes, only the validity and authenticity of the certificate are checked by verifying who issued and signed it [13]. Starting from 12 May 2021, green certificates are issued at the level of the city of Belgrade. In this way, the city administration with the use of information and communication technologies helps citizens who need this type of electronic certificate.

When we talk about the e-Government portal euprava.gov.rs, which operates at the Office for information technology and electronic administration of the Government of the Republic of Serbia, as well as electronic services offered by the city of Belgrade, especially during the epidemic caused by the COVID-19 pandemic, it is necessary to improve electronic services and form a place where citizens will be able to provide as many services as possible, for which they previously had to physically go to various institutions. The e-Government portal of the Republic of Serbia is a central place for electronic services for all citizens, businesses and employees in the state administration. The use of the portal has made it easier for citizens to communicate with state bodies and the entire public administration in terms of an easier finding of information and appropriate forms, as well as easier submission of requests, receipt of decisions and other documents. The portal enables certain procedures before the public administration, which have been performed at the counter so far, to be performed from home without physically coming to the counter [14]. The portal has greatly contributed to bringing certain services together in one place and facilitating access to end users. The situation caused by the COVID-19 pandemic indicated that as many services as possible must be available on the portal. However, some of the services require a physical visit to the institution, regardless of the electronic registration on the portal. This should be one of the goals of improvement in the coming period, more precisely to reduce the number of visits to institutions for certain services for which it is not necessary.

When it comes to the city of Belgrade during the pandemic, the service available through the BG portal and the Beokom service was largely used. Citizens were able to see all the most important information and restrictions during the COVID-19 pandemic in one place through these portals. However, in this part, there are opportunities for further improvements in the use of IT technologies in order to communicate with citizens both during emergencies and during peacetime conditions.

Moreover, there are the weaknesses of the use of ICT at the level of the city of Belgrade like are unavailability of such technologies in rural areas, different approaches to the use of ICT and the need to control access. The city of Belgrade, in addition to the urban part, also has parts of a rural character. In these parts, it is difficult to expect citizens to be able to use ICT during the COVID-19 pandemic. Different institutions have different approaches to use of ICT. This made coordination even more difficult with the use of ICT during the COVID-19 pandemic. Taking into account the large number of people who worked during the pandemic in the management and use, special attention should be paid to the access control to prevent misuse of access.

4. RECCOMENDATIONS FOR IMPROVEMENT OF USE OF ICT AT LEVEL OF THE CITY OF BELGRADE

COVID-19 pandemic showed that the city of Belgrade has a well-developed mechanism for the use of ICT to inform citizens, facilitating access to services as well as management and leadership during the state of emergency. In addition, there are opportunities to improve and enhance the use of ICT at the level of the city of Belgrade.

As already emphasized in the previous chapter, it is necessary to work on uniting as many electronic services as possible in one place, which would be directly available to citizens. For example, solving communal problems that require the engagement of several communal companies can be united in one place where citizens would point out a problem that refers to several subjects through one request. A similar service already exists on the BG portal. However, when there is an individual solution at the level of one utility company, there are bureaucratic difficulties, slow administration and delays in implementation. The pandemic has shown that in these situations the use of ICT can be very useful to speed up the procedure and to avoid physical contact. Given the predictions that similar situations such as the COVID-19 pandemic can be expected in the future, there is an obvious need for increased use of IT technologies at the level of the city of Belgrade in order to facilitate communication with citizens and solve their problems.

The COVID-19 pandemic has shown that the city headquarters for emergency management must use IT technologies. Within the limits of physical contact city headquarters for emergency management could have maintained only electronic sessions. On the other hand, the representatives of the city government and the city Secretariat for defense, emergency management, communications and coordination of public relations led to the headquarters functioning smoothly during the entire pandemic. Thus, in the future, there is a need for the city headquarters for emergency management to have its own independent room for work with enough space and with all the necessary IT equipment that meets the standards for work in electronic mode. Also, such a space, based on the examples of the world metropolises, should be located near Beokom, which provides information and administrative support to the work of the headquarters.

Decisions during COVID-19 pandemic had to be made with constant time constraints. In such conditions, rapid data processing for efficient and effective decisions is crucial. In order to get usable information as soon as possible, it is recommended to use different software that processes data and creates different reports, comparative analyses, modeling, and more. There are many examples of such software, but for the needs of the city headquarters for emergency management, the government of the city of Belgrade should choose one that can be used in various forms of natural and technical disasters, such as epidemics and pandemics. Persons who would use this would go through previous training and persons with experience in working with the city headquarters for emergency management would be selected for that.

5. CONCLUSION

The global pandemic caused by COVID – 19 pandemic has indicated that many areas must rely on the use of ICT. Changes in business and operations were rapid and had to be applied in an unstable environment. In these circumstances, local authorities were also forced to rely on modern technologies to enable the functioning and provision of services to the population.

Use of ICT has proven to be very useful during various forms of emergencies. Regardless of whether it is an earthquake, flood, fire, the use of ICT raises the level of efficiency during the response phase as well as during prevention phase. The crisis caused by the COVID – 19 pandemic showed significant use of ICT.

The city of Belgrade is a good example of the use of ICT during the COVID – 19 pandemic. The work of the emergency management headquarters of the city of Belgrade was based on electronic sessions from the very beginning of COVID – 19 pandemic. This is especially important bearing in mind that it was up to this body to make key decisions regarding the restriction of population movements. Issuing certificates and providing various services to citizens were also realized during the pandemic with the help of electronic services and information and communication technologies. In addition to the above, the city authorities have identified a detailed analysis of opportunities to improve the use of information and communication technologies in cooperation and relations with citizens, such as combining as many services in electronic terms and without the obligation of physical visits to city institutions.

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