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Impact of Pandemics on e-Government Services: A Pilot Study

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ABSTRACT

Focusing on COVID-19 as a prime example, this paper reports on a pilot study on the impact of wide-ranging catastrophic events like pandemics on the demand for and the supply of e-government services. Such e-services in general are of great consequence for enduring socio-economic development but may become especially important in crisis situations. The purpose of the study is to identify the specific issues related to providing necessary e-government services during and in the aftermath of an outbreak and ensuring the continuance of essential public services operations. This research provides a basis for managing and responding to such events in the future and help maintain and perhaps improve the e-government services that are most needed. The pilot study was conducted in a municipal administration in Poland. Based on interviews with city administrators and technical staff involved with providing and maintaining e-government services, the issues faced due to COVID-19 as well as the reactions and responses to these issues are investigated to develop guidelines for future handling of similar crises.

Keywords: COVID-19, catastrophic event, disaster, digital government, e-government, e-government services, electronic government, municipal administration, outbreak, pandemic, socio-economic development.

INTRODUCTION

Restrictions and regulations enacted in many countries to deal with COVID-19 have had substantial implications for many aspects of daily lives and also affected long-term socio-economic development. In particular, extensive and long lasting lockdowns in many

communities created increased importance and expanded roles for digital technologies (Soto-Acosta, 2020). Internet, wireless connectivity, cloud computing, email, online video conferencing, distance education tools, and online public services have become essential instruments for work, learning, communication, and entertainment.

In this environment, e-government (electronic government) also plays an increasingly prominent role. Based on the discussion by Grönlund and Horan (2005), we define e-government as utilization of information and communication technologies, and particularly the Internet, by central, regional, and local authorities to provide information and various services to the public.

Catastrophic events are unexpected occurrences that cause vast economic damage and/or substantial loss of lives. Catastrophic events may include terrorist attacks, earthquakes, volcanic eruptions, hurricanes, financial crises, animal diseases, and epidemic outbreaks, all of which cause various levels of anxieties and raise fears among the general population (Ehlert et al., 2020).

Frequently, the terms epidemics and pandemics are used interchangeably (Morens et al., 2009), as they both refer to catastrophic events caused by the rapid spread of disease to a large number of people in a given population within a short period of time. A pandemic is generally understood as an epidemic that has spread across a large region, crossing international boundaries (Morens et al., 2009; Shope, 1958).

Despite mixed outcomes in past e-government implementations (Pedersen, 2017), e-government services are important in supporting the mission of administrations to serve the public in a transparent, efficient, and fair manner, and in times of crisis provide guidance and support. Availability and utilization of effective and efficient e-government services produce multiple benefits, such as increased operational capability and reduced cost, greater transparency, less likelihood of corruption, more timely processing of citizens' requests, and more reliable information for politicians, government officials, and other decision makers, and thus are important factors in enduring socio-economic development.

The proper use of e-government services may be of particular consequence during catastrophic events that disrupt the social system and the normal functioning of government services and create circumstances where decision makers must make and implement consequential decisions under enormous time pressure. Complicating matters further in our current global environment is

the necessity for local governments to adapt actions prescribed by national or international organizations to local conditions (Roztocki et al., 2019).

The general purpose of the larger project of which this pilot study is a part of, is to advance the understanding of e-government delivery and utilization so as to help maintain and improve the efficiency and effectiveness of e-government, particularly during catastrophic events. The ultimate goal is theory development to help explain the impact of pandemics on various aspects of e-government, and thereby provide a foundation for responding to such events in the future. Such theory thus would also substantially contribute to socio-economic development, defined as “a process of changes or improvements in social and economic conditions as they relate to an individual, an organization, or a whole country (Roztocki & Weistroffer, 2016, p. 452).”

More specifically, this larger project aims to gain a better understanding of how wide-ranging catastrophic events, such as the COVID-19, impact the demand for and the supply of e-government services, and to develop guidelines or a framework for managing and responding to such events so as to help maintain and perhaps improve the services that are most needed. This involves identifying particular features of catastrophic events and how these features increase or decrease the need for e-government services, and how they may affect the acceptance of e-government services (e-services) by the public. It also involves identifying factors in catastrophic events that affect the delivery of e-government services and possible means of overcoming negative bearings of such factors.

The purpose of the current paper is to report on the results from a pilot study exploring the specific issues related to providing necessary e-government services during COVID-19 and the consequences related to these issues. Thus, two specific research questions are investigated:

RQ1. What specific issues arose from COVID-19 that may impact e-government services?

RQ2. How do circumstances caused by COVID-19 affect the continuing supply of needed e-government services?

The rest of this paper is structured as follows. After providing some background to the topic of our investigation based on existing literature, we describe the research approach and methodology for the pilot study. Next, we report on our preliminary findings and the analysis of these results. We conclude by discussing the outcomes of the pilot study and the next steps in the larger project and future research plans.

BACKGROUND

A rapid spread of an infectious disease within a short period of time and affecting a large number of people is termed an epidemic (Morens et al., 2009). Whereas an epidemic may be restricted to a specific location or population, when it spreads across large areas and multiple countries, it may be designated a pandemic. The term pandemic is commonly associated with an upsurge of deadly illness that presents clear danger to humanity and which when not addressed properly may result in substantial depopulation (Morens et al., 2009). Some well-known deadly pandemics of the past include the 14th century Black Death or Plague that reduced the population of Europe from around 75 million to 20 million by some accounts (Getz, 1991) and the 1918 Spanish flu which caused around 50 million deaths (Morse, 2009).

There is, however, no general agreement on a formal and precise definition of what constitutes a pandemic (Morens et al., 2009). In general, for an outbreak to be labeled a pandemic it must be an infectious disease that affects a large proportion of the population with widespread geographic extension. Though common perception has been that a pandemic entails widespread illness with substantial overall mortality, many health-related international organizations no longer use severity as a criterion in determining when a particular outbreak should be designated a pandemic. Thus until May 2009, the World Health Organization (WHO) defined pandemics as outbreaks generating “enormous numbers of deaths and illness,” but after May 2009, WHO dropped this phrase describing severity (Cohen & Carter, 2010).

The ambiguity of when an outbreak constitutes a pandemic and when a pandemic starts and ends can lead to uncertainty in the business environment and in social life (Roztocki et al., 2020). This lack of a clear definition of the situation and the, often, extemporaneous government responses necessitated by sudden and unexpected developments may result in strong dissatisfaction with authorities and resistance to crisis management directives. Draconian protective measures such as lockdowns may be perceived as unnecessarily strict by some citizen groups, while at the same time may be criticized as being too relaxed for handling the pandemic by other groups. In general, a pandemic may substantially strain citizens’ trust in the authorities. In such crisis situations, effective communication between government and citizens becomes particularly important, and e-government may prove very beneficial as a tool to facilitate not only indispensable communication, but also provide special services that may be required.

The term e-government (for electronic government) emerged in the 1990s (Grönlund & Horan, 2005) and has been defined in various ways (Mustafa & Sharifov, 2018). As stated in the Introduction section, and based on the discussion by Grönlund and Horan (2005), we define e-government as utilization of information and communication technologies, and particularly the Internet, by central, regional, and local authorities to provide information and various services to the public.

Irrespective of variations in definition, e-government in its many forms has become increasingly important for a country or locality in supporting its mission to serve citizens in a transparent, efficient, and fair manner (Carter & Belanger, 2005), and thus is an important factor in the social and economic evolution in highly developed as well as in developing countries.

Suitable e-government initiatives can lead to transformational government (t-government) that will improve the relationship between citizens and government bodies (King & Cotterill, 2007; Sipior et al., 2011). Consequently, e-government has also taken on a major role in academic research (Rodríguez Bolívar et al., 2010). Increased prevalence of e-government potentially provides multiple benefits for public administration, such as increased operational efficiency and reduced cost, greater transparency, less likelihood of corruption, more timely processing of citizens' and businesses' requests, and more reliable information for politicians, government officials, and other decision makers. Furthermore, recipients of public services, i.e., citizens and businesses, benefit by having their cases handled remotely and thus saving time.

Availability and usage of e-government may be of particular consequence during and following catastrophic events such as pandemics, which disrupt the social system and the normal functioning of government services. E-government provides a means for sharing data, communicate information, and coordinate activities when responding to a catastrophic event (Jaeger et al., 2007). Effectual government reaction to catastrophic events must rely on societal compliance with imposed emergency regulations and restrictions, and to achieve societal compliance, efficient communication, such as e-publication, is essential. E-publication, making information available via the Internet, is one of the most important and widespread uses of e-government (Reitz, 2006). Providing relevant, timely, and reliable information to the populace may reduce citizens' anxiety, distrust, and dissatisfaction with authorities.

E-voting is another important facet of e-government (Moynihan, 2004). Accordingly to Svensson and Leenes (2003), e-voting can be defined as any voting that involves electronic means. As catastrophic events may coincide with local, regional, or national elections, availability of e-voting may allow elections to proceed as scheduled and prevent disarray in governance. However, e-voting poses security risks (voter fraud), and the mechanism employed for e-voting must include high levels of control and transparency to avoid controversy and distrust. Apart from the usefulness of e-voting in public elections, that is, citizens electing their representatives, this new technology can also enable members of representative bodies conduct their internal voting in virtual sessions during a pandemic.

Problems with successful e-government implementation exist on both the delivery side of services, as well as on the user side, where there has always been a problem of non-participation by segments of the populace, as a substantial number of citizens or other residents in a country or geographical area do not make use of the e-government services being offered (Bélanger & Carter, 2008). Resistance to participation in e-government services may occur in highly mature economies like Singapore, where after implementation of an e-filing process, the majority of taxpayers still preferred to file on paper (Tan et al., 2007), as well as in less developed economies, like Jordan, where a large portion of the public refuses to use the e-government services being offered and rather continues to visit the appropriate agencies in person (Al-Soud et al., 2014). In another example, reported in a study that examined the use of SMS-based e-government services in Indonesia, Susanto and Goodwin in 2013 (Susanto & Goodwin, 2013) identified a large group of young college students that for various reasons did not participate in these services. A more recent study conducted by Van de Walle et al. in 2018 (Van de Walle et al., 2018) looked at non-participants in e-government services in Latvia. According to this study the main reasons for non-participation were inadequate computer skills and competence, and lack of equipment and reliable access.

The reasons given by researchers for non-participation in e-government services by members of the public under normal circumstances are ambiguous and not always supported by systematic research. Non-participation refers to individuals not participating in specific e-government services being offered, for whatever reason. Non-acceptance may imply rejection of e-government in a broader way, possibly for emotional reasons. Non-adoption may indicate a lack of awareness or readiness to participate in e-government, rather than outright rejection. However,

many authors use these three terms interchangeably. In the early stages of digitalization, it was presumed that the main reason for some people not participating in e-government was the lack of access to the Internet and technology, such as computers, smart phones, and other mobile devices (Ebbers et al., 2016). As digital access improved, mainly due to technological progress and governmental policies, academic research extended the explanations for non-participation to other factors, such as age, education, gender, location, and disability. Jacob, Fudzee, and Salamat (2017) and Jacob, Fudzee, Salamat, and Herawan (2019) developed a conceptual model for generic e-government adoption, based on the information systems success model of DeLone and McLean (2003) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003).

However, the effects of wide-ranging catastrophic events with a global reach, such as COVID-19, on participation or non-participation in e-government have not been investigated. Issues, such as material loss, spread of disease or loss of lives, and other societal consequences arising from catastrophic events may substantially affect prospective participation or non-participation in e-government services. Thus, for example, during catastrophes, as events unfold and new data become available, government officials and decision makers may frequently change their courses of actions, which may affect the public trust in e-government services.

METHODOLOGY

As stated earlier, the pilot study described in the current paper serves as preparation for a larger project with the goal of expanding our understanding of e-government during catastrophic events. The research strategy for this larger project is multiple-case design. Case study methodology is appropriate to explore the dynamics of organizations during special situations and for development of theory (Eisenhardt, 1989). The multiple-case design as compared to single-case design is the preferable method for developing a conceptual framework and theory building (Yin, 2014). The single-case pilot study reported on in this paper was conducted in one of the City Halls (or City Administration Offices) in Poland with the primary objective of developing a sound procedure to be followed during the subsequent phases of the larger project.

City Halls (in Polish: *Urzedz miasta*) offer a wide variety of services to individual residents and to business entities, such as issuing identification documents and driver's licenses, recording births, marriages, and deaths, registering vehicles and boats, issuing permits to sell alcohol,

licensing new business ventures, handling issues related to property taxes, and collecting bids for public tenders. Many of these services are accessible on-line. Thus, City Halls are involved in many e-government initiatives and have abundant experience dealing with the general public, including during COVID-19.

Poland seems to be well suited for investigations about e-government and related concepts such as e-voting and e-democracy and to obtain answers to our research questions for several reasons. First, Poland can be classified as a double transition level economy according to the classification proposed in 2015 by Roztocki and Weistroffer (2015). A double transition economy is defined as a country that underwent an abrupt change from a centrally planned economic system and one-party controlled political system, to a market-based economy and democratically elected government. This double transition is accompanied by a simultaneous emergence of a new class of entrepreneurs and the partial replacement of former political elites. By implication, many free market and democratic mechanisms are less deeply rooted in Poland than in more established free-market democracies. Second, part of the Polish population, in particular the older generation, due to experience under communism, may distrust authorities regarding COVID-19 containing regulations and perceive e-government initiatives as mechanisms to establish more government control, perhaps even leading to dictatorship.

Employees at City Halls, due to the nature of their work, interact with many individuals across different socio-economic groups, and are likely to be well able to assess the impact COVID-19 has had on e-government activities. Thus, employees at City Halls appear to be a reasonable group to target for sharing their experiences with various e-government initiatives during COVID-19 and their opinions on how participation or non-participation is affected during and possibly in the aftermath of catastrophic events.

The particular City Hall chosen for the pilot study is responsible for providing public services for almost 200 thousand residents and over 30 thousand business entities (data from 2020 available at bdl.stat.gov.pl). At the time of our study, 240 types of applications could be submitted online (archival data source provided by City Hall). This City Hall was selected mainly because we had already worked with some of its personnel on a different research project, and the management and staff had been unusually congenial and helpful.

The primary data were collected via interviews, which, because of the continuing lockdown, were done remotely via teleconferencing software. Interviews were conducted in Polish by the authors and recorded, then transcribed by professional services and translated into English. Transcripts and translations from Polish into English were randomly checked for accuracy.

However, to minimize bias on the part of the researchers and to improve the trustworthiness of the outcomes, the analyses and findings in this paper are also supported by data from archival sources shared by officials after the interviews and from materials available on the public website of the City Hall. The archival data includes a list of all e-services (with descriptions) provided by the City Hall; a list of interactive electronic forms available to constituents via the City Hall website; statistical summaries of e-services provided in the year before and the year of COVID-19 from selected departments/centers of the City Hall; information on remote management of City Hall meetings using voting support software; regulations on internal e-voting on budget matters; and additional information on the dedicated smart phone application for e-voting.

An initial set of questions was developed ahead of time to guide the semi-structured interviews. These interview questions align with the two main research questions stated earlier and are listed in Table 1.

Table 1. Interview questions

<p>Interview questions related to RQ1</p> <p>a) Can you list any specific issues caused by COVID-19 or by the lockdown that impacted the e-government services provided by your organization?</p> <p>b) How did new or changed regulations due to COVID-19 affect the e-government services provided by your organization?</p> <p>c) Can you list any specific changes in employees' behaviors or and attitudes caused by COVID-19 that impacted the e-government services provided by your organization?</p> <p>d) Do you foresee changes in employee's attitudes that will impact the way e-government services may be provided in the future, post pandemic?</p>
<p>Interview questions related to RQ2</p> <p>e) Are there specific factors related to COVID-19 that made it difficult for your organization to keep up the e-government service level that you had been providing before the pandemic?</p> <p>f) Has there been an increase in employee absenteeism, resignations, or retirements due to COVID-19 and if so, how did that affect the e-government services provided by your organization?</p>

During the course of three days in May 2021, a total of six semi-structured interviews were conducted, lasting from a minimum of 25 minutes to a maximum of 65 minutes. In addition to covering the questions from Table 1, each interview opened with a general clarification of the services that the City Hall provides online, and a brief discussion as to which of these e-services are most commonly used and by whom, as well as any plans for expanding these e-services offerings in the near future. Each interview closed with an open-ended question, allowing the interviewee to add anything he or she deemed relevant.

The interviewees were managers in the City Hall who shared their observations regarding the work of the information technology (IT) department, the tax collection department, the civil registration office, and the land survey office. All departments of the City Hall remained open during COVID-19 and provided uninterrupted services. The interview sessions are summarized in chronological order in Table 2, showing the profiles of the interviewees (P1 means interviewer or person 1) and the duration of each session.

Table 2. Interview sessions

Code	Profile of interviewee	Duration
P1	Head of the Surveying and Cartographic Documentation Centre	43 min.
P2	Deputy Director of the Financial Department	25 min.
P3	Deputy Head of the Registry Office	61 min.
P4	Director of the IT and Telecommunications Service Office	55 min.
P5	Deputy Director of the Civil Affairs Department	31 min.
P6	Head of the Tele-informatics Service for Residents and Public Information	65 min.

To answer the two research questions and to develop an initial conceptual framework in preparation for more advanced theory development in the later phases of the larger project, a preliminary analysis of the interviews was carried out with the use of a computerized coding tool, MAXQDA.

Open, axial, and selective coding (Strauss & Corbin, 1998) processes were applied to fit the interviewee responses into codes and categories. Few coding trees were developed. First, open coding was used to identify specific concepts and their properties and create initial codes based on the textual field data line-by-line. Examples of these initial codes include: "Physical offices closed", "Cash register closed", and "Changes in work settings". Second, axial coding was applied to find the relationships between the initial concepts or codes and create major code

categories, such as for example: "Physical changes in operations", "Shifts in volume and types of services", "Changes in employee attitudes and behaviors". Finally, selective coding was used to develop meta-categories, such as "Issues due to COVID-19".

As suggested by Yin (2014), a pilot study and the encompassed data analysis can help with refining the data collection plans in regard to both the content of the data and the procedures to be followed in later phases. Thus, the experiences gained from the pilot study preparation, arrangements, and interviews, and the analysis of the transcripts will be used to augment our research questions as well as refine our interview questions for the larger project.

FINDINGS

In the interviews, all six managers confirmed what has been reported in other studies (Soto-Acosta, 2020), i.e. that COVID-19 substantially accelerated the digital transformation, including the demand for e-government services. Many of the currently offered e-services were available via publicly accessible websites even before COVID-19, but they were little used.

COVID-19 markedly speeded up the demand for e-government services, as was corroborated by all of the interviewees. One of managers pointed out that the increase in usage of e-services was also dependent on the urgency of the matter under consideration, the age of the applicants, and their ability to use e-government solutions:

...It is safe to say that the demand for e-services has increased, in particular for certain groups and ages, but it also was dependent on whether it was something very urgent, or whether it could wait for later, i.e., till the opening of the office (interviewee P6).

We judiciously sifted through and analyzed the six interview transcripts focusing on our two research questions. In answer to the first research question, "What specific issues arose from COVID-19 that may impact e-government services?" we identified several specific concerns voiced by the participating managers. Table 3 lists these concerns in the left column, while the numbers in the right column identify who raised the particular issue.

Table 3. Identified issues

Issues due to catastrophic event	Code
Physical changes in operations	
Physical offices closed	P5, P6
Cash register closed	P6
Changes in work settings	P1, P6
Inability to sign documents personally	P1, P2
Stricter sanitary requirements	P5, P6
Limited access to non-digitalized archives	P1, P3
Shifts in volume and types of services	
Surge in telephone call volume	P6
Surge in traditional mail	P2, P6
Surge in demand for e-services	P1, P2, P3, P4, P6
Surge in e-voting by residents	P6
Increased information needs	P6
Shift in type of services demand	P5
Shortage of well-trained IT specialists	P4
Inadequate IT infrastructure	P4
Changes in employee attitudes and behaviors	
Surge in employee absenteeism, including sick leave and care for children and spouses	P2, P3, P5 P6
Employee concerns about health/life	P3, P5, P6
Employee concerns about losing jobs	P6
Changes in regulations and enforcements	
Distrust in electronic documents	P1, P4, P6
Increase of imposed fines	P6
Fast changing regulations	P1
Legal restrictions on e-services	P3, P5
Quarantine requirements	P6

The issues that came up in the interviews and listed in Table 3 seem to fall into four distinct groups: The first six issues are mostly related to physical changes in how the City Hall operates; the next eight issues are about shifts in volume and types of services required; three issues deal with changes in employee behaviors and concerns; and the last five issues relate to new regulations and stricter enforcements policies.

With respect to the first group, concerning physical changes such as closing of offices and changes to operations, one of the interviewees stated:

... once the pandemic broke out and the first COVID-19 restrictions just came about, the office was temporary closed to petitioners. (...) So the personal contact that was very important for some people, well, here it was limited (interviewee P5).

The overall situation caused by COVID-19 required the city authorities and managers to arrange an emergency meeting to reorganize the way in which the City Hall operates. In addition to temporary closing of offices, changes in work settings were necessary to ensure continuity of the services provided by the City Hall. However, many more problems arose, such as access to non-digitalized documents, which were available only in the City Hall offices, and restrictions on providing electronic signatures from outside of the office. As one interviewee maintained:

In my department it's impossible to switch to remote work only (...) because the ministry will not set up a special link at my home to ensure a safe connection and provide the ability to work remotely securely, such as to sign documents electronically. I have to do it on-site in the office (interviewee P3).

Another group of concerns had to do with shifts in volume and types of services provided by City Hall. In general, it was observed that COVID-19 shifted the ways in which constituents communicate with City Hall, turning away from face-to-face interaction and towards e-services. However, COVID-19 also resulted in overall higher telephone call volume and in an increase in traditional mail correspondence. Interviewees also mentioned the struggle by the older generation with embracing e-services over making personal visits to City Hall, and the high rate of incorrect entries in e-applications that require follow-up calls or even follow-up in-person visits to City Hall. Officials observed also a shift in demand for the different types of services provided by City Hall. Concurrently with these issues, troubles with the adequacy of the existing IT infrastructure became apparent, as well as a shortage of well-trained IT specialists, as noted by one of the interviewees. More specifically, the interviewee stated that:

... the implementation of e-services caused us additional problems, instead of reducing them, because before the pandemic all e-forms were relatively efficient. During the pandemic, the demand increased and e-forms (...) were often completed incorrectly, requiring repeated contact between the constituent and the city official. (...) This resulted in overloading of telephone lines (...) and repeated sending of the same e-forms unquestionably jammed, informally speaking, the

Internet connection and ICT (information and communication technologies) systems processing (interviewee P4).

A third group of issues brought up by some of the interview participants relates to employees' behaviors, their health concerns, and fears for their families' wellbeing and security. A significant increase in absenteeism was noted, often due to employees calling in sick or needing to take care of children during the lockdown, as schools were closed. However, in terms of the impact of these absences on e-services provided by City Hall, responses were mixed, with some interviewees maintaining that there was no significant impact on the continuity of e-services provided.

... these absences were not on such a large scale that they disrupted the work of the department (interviewee P5).

Absences were mostly due to illness, childcare, and that's it. (...) we tried to make our absences at work as minimal as possible, because we were aware that if we are not there, the other people in the office will have much more work (interviewee P6).

The last group of issues is about regulations and enforcements. Here, the interview participants indicated that a large portion of e-services is strictly regulated by law, and the City Hall is limited in the range of what it can develop or where it can modify requirements. In addition, the frequently changing regulations were spotlighted as an issue, including those related to the mitigation of the negative effects of COVID-19. City officials feel obligated to follow and enforce regulations, especially if new rules introduce new deadlines or penalties. Moreover, a focal issue that arose in the interviews was the question of trust in electronic documents. According to one department head:

I noticed that the problem (...) was on the side of the client who did not have any confidence or belief in electronic documents (interviewee P1).

...electronic documents are viewed very distrustfully and only the printouts of electronic documents are taken seriously by the citizens and the residents... (interviewee P4).

In seeking answers to the second research question, "How do circumstances caused by COVID-19 affect the continuing supply of needed e-government services?" we again analyzed the interview transcripts, matching the issues listed in Table 3 to conceivable effects. Table 4 depicts

the particular concerns raised by the managers in the left column, and the corresponding consequences to these issues in the right column.

Table 4. Issues and consequences

Issues	Consequences
Physical changes in operations	
Physical offices closed	Shift to e-services
Cash registers closed	Shift to e-payments
Changes in work settings	Reorganization of work and shift to remote work Shift to e-voting in city council meetings
Inability to sign documents personally	Increased use of electronic signatures
Stricter sanitary requirements	Extra expenses
Limited access to non-digitalized archives	Extension of case resolution times
Shifts in volume and types of services	
Surge in telephone call volume	Increased workload
Surge in traditional mail	Increased workload
Surge in demand for e-services	Adapting to demand
Surge in e-voting by residents	Adapting to demand
Increased in information needs	Increased workload
Shift in type of services demand	Adapting to demand
Shortage of well-trained IT specialists	Increased workload and delays
Inadequate IT infrastructure	Increased workload and delays
Changes in employee attitudes and behaviors	
Surge in employee absenteeism (sick leave and care for children or spouses)	Increased workload and delays
Employee concerns about health/life	Offering work motivation
Employee concerns about losing jobs	Offering work motivation
Changes in regulations and enforcements	
Distrust in electronic documents	Printing of documents
Increase of imposed fines	Increased workload
Fast changing regulations	Increased workload
Legal restrictions on e-services	Increased workload and delays
Quarantine requirements	Staff reassignments

As depicted in Table 4, 13 distinct consequences of COVID-19 to the continuing supply of e-government services were asserted by the interviewees, with the most frequently mentioned ones being increased workload and the resulting delays as well as the need for adapting to demand and offering work motivations.

Temporary closing of City Hall offices, including the cash register, resulted in increased use of e-services and e-payments, especially by professional clients, as was stated by one of the interviewees:

There is a huge increase in demand [for e-services] in the group of professional users. That is, users who professionally use documents ex officio. So, for example, surveyors, designers, developers, and people in the construction industry, who deal with a large number of issues on a daily basis (...) And now, after launching these e-services, they suddenly realized that without getting up from their chairs, (...) sitting in front of the monitor, it can all be arranged and settled in a moment. So, the client does not waste time and money in commuting, while also saving our time... (interviewee P1).

Reorganization of work and shift to remote work were another consequence. At an internal meeting of the city president and the directors and heads of City Hall offices, in response to the changes in work settings due to COVID-19, it was agreed that employees will be directed to work remotely, and that some internal deadlines for dealing with specific cases will be extended, mainly because of limited access to non-digitalized documents, and that communication with local residents must be improved.

During COVID-19 it became natural to communicate internally via e-mail and through teleconferencing software, instead of personally, as had been customary. The City Hall officials also required their employees to make use of a new technology platform that had been acquired one year before COVID-19 to organize regular online meetings. In particular, the new technology platform allows e-voting by the members of the city council (in Polish: Rada miasta), a sort of local parliament or legislative body at the city level. Using this option, members of the city council can vote remotely on various issues by using their smart phones or computers. Overall, the e-voting option was very well received by the members of the city council and considered as trustworthy, as voting is open, and the voting protocol provides precise information on who voted for what. One of the interviewees stated:

We launched the e-voting system [for voting on city council resolutions] in 2019 as a pilot. (...) ... that was the idea, and it actually transformed nicely at a time when the situation changed during ... [COVID-19]. Members of the city council who wished to participate in the voting and did not want to come to the office, could vote from home (interviewee P6).

In addition to the e-voting platform for members of the city council, a different and separate e-voting system for residents had been instituted earlier, before COVID-19, to allow increased involvement of ordinary people in local initiatives and enable direct voting on a civic budget (in Polish: Budżet obywatelski), a form of participatory budget in which residents co-decide on a part of public spending. In essence, a civic budget allows residents to vote on specific projects, such as constructing a new playground, planting trees and shrubs in an existing park, or improving street lighting. The statistics provided, and the observations shared by one of interviewees indicate that during the outbreak the interest in voting on civic budgets increased in general. In particular, using the e-voting platform contributed to a substantial increase in voter participation and reduced the use of the conventional voting method. According to one of the interviewees:

...when it comes to e-voting, in 2019 we had 17,922 votes for the civic budget, including 6,947 votes on paper. In 2020, the total number was 77,510, including 4,300 on paper, and in 2021, just until now [a few months into the year], we already have 60,940 votes, and only 272 on paper (interviewee P6).

During three months of repeated closings of the City Hall, new sanitary requirements were introduced, and the city administration offices were reopened to citizens with some limitations. Looking at the archival documents it showed that in the two periods between the three lockdowns, the number of e-services and telephone calls decreased somewhat. Evidently, during times that the lockdown rules were eased, many citizens preferred face-to-face visits to City Hall. However, the demand for e-services was still higher than it had been the year before COVID-19. What is more, compliance to the new sanitary requirements resulted in additional public expenditures.

Increased use of electronic signatures was another consequence, as officials became unable to sign documents personally. Employees had already been equipped with qualified electronic signature capability before COVID-19 and now used them much more frequently to sign official, already digitalized documents.

... in fact, all employees in our office have already a trusted profile. (...) I think [officials] will be bolder in the future [in the use of electronic signature]. (...) The situation forces us to get out of this comfort zone a bit, so as not to be afraid (interviewee P2).

One of the most frequently mentioned consequences by the interviewees was the increased workload. They generally concurred that several issues due to COVID-19 significantly increased the extent of tasks and the need to acquire additional expertise through training and from consulting officials at other City Halls.

... I never experienced that the office did not support employees in terms of training and improvement of qualifications. (...) we have such options thanks to the city authorities. Discussion panels with other offices help me a lot. We are in touch all the time (interviewee P3).

Additionally, delays in processing cases were a consequence not only of highly increased demand in e-services, in combination with inadequate IT infrastructure and a shortage of well-trained IT specialists, but also of a surge in employee absenteeism, though opinions on the significance of this were mixed. While some interviewees stated that employee absences led to postponing some cases, others maintained that there was no significant impact on the continuity of e-services provided.

No, because there are substitutes with us. (...) Because it wasn't that big a scale of these absences that it disrupted the department's work (interviewee P5).

... a lot of employees in my office (...) have small children, (...) and there is a big problem here, because with the expansion of e-services, hardware and software may fail or hang up, and the employees in charge are not available, (...) and so the service time has to be extended (interviewee P4).

Due to high absenteeism, other employees are suddenly burdened with double the number of tasks. She/he is under total stress. This has an impact on the quality of work (interviewee P3).

The varied responses with respect to the impact of absenteeism lead to conclude that the system in place for substitution of absent employees led to fairly uninterrupted provision of e-services in some departments, while in other departments the service response times had to be extended.

In handling the IT problems that arose during COVID-19, the City Hall enhanced its own existing e-services platform in order to expand the volume of e-government services offered, while previously the central government platform for e-services had been used. They also improved the official City Hall website to distinguish the most important information during

COVID-19 and they are preparing for deployment of chatbot on this website to improve effectiveness in communication with citizens.

Changes in regulations due to COVID-19 require some time to become familiar with, which creates an additional workload. Also, enforcing penalties requires verification and is time-consuming. One of interviewee said:

We have regulations for this, models of different documents. And the office has to respond to that. Legal interest. We also need to take this into account when issuing a document. So, there is another piece of information and another letter to the site (interviewee P3).

The case of work motivation was also a point made during the interviews. It was observed that officials have great self-motivation to serve the community. However, this is negatively impacted by concerns about health and even life and concerns about losing jobs, as well as stress connected with high increase in workload and upcoming deadlines. To understand the situation, it needs to be pointed out that in some City Hall offices the employees provide services remotely as well as personally in the office. One of the interviewees said:

There were especially fears for their health and life here. Since we previously had these open positions, one could say that there was unlimited contact between the applicant and the employee. So here the workers started asking for some protection (interviewee P5).

Another issue raised during the interviews deals with citizen distrust of remote communication and electronic documents. The process of submitting and receiving traditional printed documents are much preferred by many applicants.

Citizens prefer to come to the office and leave these documents, then come for them, call the official, ask what the status of the case is. They prefer this personal contact (interviewee P5).

The last identified consequence by interviewees is staff reassignments caused by changes in regulations in the scope of quarantine requirements. One of the interviewees explained:

We all had to shift to a different track. First of all, not all employees were there [in offices] because of (...) quarantine. Remote work [in that situation was required by governmental restrictions] was organized on a weekly basis, so that employees passed each other, that they did not meet and (...) that the service flow was maintained. For example, to contact a professional

employee (...) and obtain information, even if he or she may not be at work, the substitution system had to work efficiently (interviewee P6).

DISCUSSION AND CONCLUSION

City Halls and other local authorities play a vital role during catastrophic events, such as COVID-19. They have closer contact to citizens and other residents than central authorities do. During such troubling times, City Halls and other local authorities provide essential services to individual residents and to business entities, such as issuing identification documents and driver's licenses, and recording births, marriages, and deaths. E-government furnishes a viable means for delivering these services.

In our interviews with six managers at a City Hall in Poland, we witnessed their dedication to providing the best possible services to their constituents. In addition, it was apparent that more consultation with the citizenry is wished-for and should be pursued as widely as possible. Current technology makes greater participation by citizen in important matters possible.

The study reported on in the current paper was conducted as a pilot in preparation for a larger project, with the goal of expanding our understanding of e-government during and in the aftermath of catastrophic events. Based on our experience with the interviews conducted and our document analysis, we will modify and refine our interview questions, possibly also adding some narrower and more precise questions. Moreover, the lessons learned from the pilot study will also be used to develop additional research questions. For the larger project, which is planned as a multiple case study, we will conduct interviews at several City Halls and talk to a larger number of participants.

In addition to serving as a pilot study for a larger project, the analysis of our interview transcripts produced several interesting findings as to the important issues that impact e-government in times of catastrophic events, as summarized in Table 3 and Table 4. Furthermore, our findings point to several additional research opportunities or needs. One such research opportunity is the intensifying drive towards electronic documents and citizens' acceptance and embrace of such documents. A related opportunity for future research is the growing practice of e-payments. As mentioned earlier, the temporary closing of City Hall offices, including cash registers, pushed constituents who were used to pay administrative processing fees or taxes in cash toward making

digital payments. However, this may be problematic for clients that do not possess a bank account and may also be a strong inhibitor of using e-services when case processing fees are imposed.

Another research opportunity is related to societal changes in the aftermath of COVID-19 . As observed by some of the interviewees, citizens are becoming increasingly more demanding and more frequently voice their discontent with the work or services provided by the authorities.

More research is also needed on new concepts and tools, such as e-voting, not only for general elections, but also in internal decision-making within organizations and specific committees. Ways to in general facilitate and promote more active participation of constituents in local decision-making seems to be an interesting and promising further research direction. E-democracy, e-voting, e-parliament are all interesting topics for future investigations. In context of this paper, e-democracy is defined as the use of ICT in democratic processes (Grönlund, 2003) while e-parliament is defined as the use of ICT in legislative processes (Olasina & Mutula, 2015). In particular, it will be interesting to investigate how COVID-19 which evidently accelerated the digital transformation (Soto-Acosta, 2020), affected the demand and implementations of e-parliaments as the means of e-democracy. As shown in the example of e-voting on the civic budget, COVID-19 accelerated residents' participation in the democratic process of co-deciding, by e-voting, on public spending in their city. Thus, it is quite plausible that citizens will demand increasingly broader direct involvement in government, i.e., more e-democracy, not limited to budgetary issues at a local level.

Not unexpectedly, our study presented in this paper is subject to some limitations. First, our discussions and results are based on only six decision-makers working at the same City Hall. Interviewing more participants working at various City Halls may provide a broader and more extensive view. Second, we only talked to people who were involved with offering e-government services. We did not obtain views or observations from citizens and residents on their appreciation of the offered e-government services. Third, we did not get input from politicians and other high-level decision-makers who may be instrumental in the implementation of e-services. Politicians' views, especially from diverse levels, locales, and political affiliations, would provide for a different angle on the issues involved. Fourth, we did not interview any businesspeople representing small businesses or executives at large corporation, who, as

mentioned by our interviewees, have different attitudes to e-government services as compared to average citizens.

Despite these limitations, which also provide noteworthy ideas for future research, we are very positive that the finding presented in this paper make an interesting and substantial contribution to the existing body of knowledge, and possibly also provide helpful information to managers in other city administrations responsible for offering e-government services.

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