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REVIEW ARTICLE

Smart City Approaches to Public Spaces and Services during and after COVID-19: Case Studies in Four Capital Cities

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Abstract: COVID-19 pandemic was reported to modify people's behaviour in using public spaces and accessing services. This fact has become a critical input related to future city development strategies, space arrangements, and the implementation of smart city. Therefore, this study aims to 1) Identify efforts in several cities during COVID-19 pandemic, specifically concerning the use of public spaces and services, and 2) Compile the outlines of future urban planning strategies after the pandemic. The aspects related to the use of Information and Communication Technology (ICT), space arrangement, and urban environment are discussed. The analysis is based on case studies in four capital cities, namely Jakarta, Paris, Bucharest, and Canberra. Furthermore, field observations and in-depth interviews are used to emphasize changes in the function and use of public spaces and services during and after the pandemic. The result shows that differences and common elements configure the transformations of urban spaces since changes in the use of public spaces are closely connected to efforts to combat the pandemic. Meanwhile, in public services, changes are associated with the increasing use of ICT and Internet of Things (IoT). In the future, cities need to show their visions according to the local conditions supporting better spatial arrangement and management of urban environment due to ICT and IoT prominence.

1. Introduction

This study was conducted based on the background of COVID-19 pandemic in 2020, including a vast geographical expanse and affecting substantial portions of the globe. In the context of the outbreak, there have been shifts in people's interactions and the use of public spaces. Furthermore, it is interesting to investigate several city cases in different countries related to the use of public spaces and services during and after the pandemic.

The implementation of smart city coping shows the significance of the use of ICT. These platforms enhance the resilience and efficiency of public services during the recovery phase post-pandemic and address complex urban issues to improve residents' responsiveness (OECD, 2021). Furthermore, collaboration among stakeholders through digital strategies is essential for better management of future pandemics (Afrin et al., 2021). Subsequent studies show a strengthening in smart governance through ICT-based services innovation and by

enhancing public information (Rachmawati, et al., 2021a). In the dimensions of smart society and economy, there has been a leap in the use of ICT to support work from home (WFH) and in accessing financial services (Rachmawati, et al., 2021b). Strengthening smart society is also associated with local wisdom in dealing with the pandemic. Similarly, a healthy living culture and environmental awareness are promoted for smart environment and living.

Many cities have been encouraged to adopt smart technology with the use of ICT. City management will be oriented to efficiency characterized by ICT-based services. Therefore, city and spatial planning must consider and take the advancements of applying the concept of smart city. During COVID-19 pandemic, some layers of society have been working from home with the support of ICT and the concept of office and business spaces may change. In the future, many cities will undoubtedly adopt the best practices in the arrangement of public spaces and the planning of city faces.

Smart city has become a global phenomenon, as shown by the implementation of this concept in various countries for better function (Barlow & Levy-Bencheton, 2018). Smart city implementation has greatly supported better management and environmental aspects (Rachmawati, 2019a; Rachmawati et al., 2020). The concept shows a city that switched from a conventional to an innovative way of managing. This is also viewed as a regional concept that can solve problems in most aspects of life, aiming at acquiring better city and environmental management through smart technology (Branchi et al., 2014; Rachmawati, 2019a; Rachmawati et al., 2020).

Smart cities are supported by the development of ICT and applications assisting the completion of each region to access public services (Branchi et al., 2014; Nam & Pardo, 2011). The community can access these public services in an online way which further strengthens the reduction in people's mobility due to the use of virtual spaces (Rachmawati, 2019b).

With the use of virtual spaces in the economic sector, e-commerce has become one of the most developed business sectors. The growth of e-commerce in Indonesia experienced an increase in daily transactions of 4.8 million, with 51% new consumers (Situmorang, 2020). SEA Insight, in June 2020, surveyed 2,200 business actors aged 16-35 years. The results show that 54% of the respondents used social media more often than before the pandemic, and 51% and 45% used the platform for shopping and e-commerce, respectively (SEA Insight, 2020). According to a survey of 206 respondents in urban areas of Jakarta, Bogor, Depok, Tangerang, and Bekasi, about 34% switched from offline to online marketing systems (Katadata Insight Center (KIC), 2020). Online product sale is seen as strengthening the use of virtual spaces on MSMEs as a form of implementation of smart city (Rachmawati et al., 2018). Telemedicine and health services, enable individuals to receive medical treatment without the necessity of physically coming to the hospital (Liputan6.com, 2020). ICT plays a significant role in developing information, knowledge, and society and is an influential agenda and a new aspect of urban and regional planning. The use of ICT has been made easier and replaces the way of working in the workplace (Rachmawati et al., 2010), enabling the development of new locations for decentralized settlements and offices (Rachmawati et al., 2015). Currently, the existence of Virtual Offices and Coworking Spaces can overcome the problem of limited spaces in urban areas (Rachmawati, 2019b). This study aims to 1) Identify what has been conducted in several cities related to the uses of public spaces and services during and after the pandemic and 2) Compile the outline of future strategies and urban planning. The study covers the aspects of ICT use, spatial planning, and urban environment. The achievement of these goals leads to the urgency of study, namely as a critical input related to the implementation of smart city, as well as urban future.

2. Methods

COVID-19 pandemic is a worldwide phenomenon and for this reason, it is necessary to conduct studies in several cities by applying case-study methods to test contemporary phenomena related to real life (Yin, 2009). This study focuses on the latest issues and leads to the value of benefits in human life, namely explaining the concept of a city from the government's perspective and the handling of the pandemic. Several study questions arise, namely: 1) What has been conducted by the city on case studies related to COVID-19 pandemic, and why did this step take place? 2) How is the implementation of smart city to overcome the pandemic, and why did this step take place? 3) What are the recommendations for urban spatial planning, and why were these recommendations taken? Finally, what are future strategy and urban planning after the pandemic and why was this selected?

This study takes a case study in four capital cities, namely Jakarta, Paris, Bucharest, and Canberra. The present study relies on previous results on Smart City Implementation in Indonesia (Rachmawati, et al., 2021a). The result shows various and unique innovations in implementing the concept of smart city according to the characteristics of the city and its people (Rachmawati, et al., 2021a). The case study method, in which the explanation emphasizes the appearance or unique things of the case was adopted (Bryman, 2008). Furthermore, the method uses the concept of triangulation (multiple sources of evidence) (Gerring, 2006), allowing interpretation through the comparison of data and information collected. Data and Information are more accurate and complementary leading to selected sources and there is an information crosscheck. Therefore, data digging was carried out through qualitative analysis, resulting from field observations, in-depth interviews, and various other sources of information.

For the data analysis, this study used smart city framework comprised of several elements including smart health, government, environment, economy, living, and mobility (Kuzior et al., 2022; Megahed & Abdel-Kader, 2022) smart cities demonstrated higher COVID-19 readiness and lower COVID-19 fatality rates. However, they lag behind in terms of resilience and sustainability of their health care systems.”,”container-title”:”Sustainability”,”DOI”:”10.3390/su141912645”,”ISSN”:”2071-1050”,”issue”:”19”,”journalAbbreviation”:”Sustainability”,”language”:”en”,”page”:”12645”,”source”:”DOI.org (Crossref. Data from an in-depth interview, field observation, and desk study were analyzed by contextualizing the elements to specifically obtain the impact of the pandemic on public spaces and services in each city (Kurniawati & Prihantini, 2019; Shedid, 2022). Initially, key information from in-depth interviews was extracted and grouped into the relevant smart city elements afterward.

3. Result and Discussion

The use of public spaces and services before the pandemic, as well as the perception of residents in each city, are significant aspects to consider. The connected relationship between smart city framework and public spaces and services

before and after the pandemic can be starkly seen in how the people in each city devised ICT. Each capital city examined performs different methods and strategies. The methods and strategies for public spaces and services vary, influenced by factors such as the implementation of smart city frameworks and the capacity of ICT.

3.1. Case Study of the City of Jakarta

In 2020, the Provincial Government of *Daerah Khusus Ibukota* (DKI - Special Capital Region) DKI Jakarta and *Badan Layanan Umum Daerah* (BLUD-the Regional Agency for Public Services) Jakarta Smart City launched https://corona.jakarta.go.id/id as a portal containing information and data related to COVID-19. BLUD Jakarta Smart City manages the development of the corona.jakarta.go.id website and integrates the corona.jakarta.go.id portal from various data sources. Furthermore, it manages the Jakarta Satu application (integrating geospatial data from more than 20 *Organisasi Perangkat Daerah* (OPDs - Regional Apparatus Organizations) and provides ten thematic maps) and Jakarta Kini/JAKI as a SuperApp where all the needs of the people of DKI Jakarta are served in one integrated application. In the future, the JAKI application will be developed as a public services application and a payment gateway.

The existence of the pandemic resulted in an impact on the transformation of digital services, specifically to the Provincial Government of DKI Jakarta from the work system, office administration processes, and public services delivery, to changes in culture. The Head of the DKI Jakarta Communication, Information, and Statistics (Diskominfotik) Office stated that the focus on digital transformation in implementing smart city revolves around enhancing information dissemination, facilitating transactions, and fostering interactive engagements (Table 1). Data-driven technology and work systems are the keys to realizing DKI Jakarta as a pandemic-proof city. Furthermore, it is necessary to accommodate the strategy for using the IoT, schemes, cross-stakeholder work systems, and funding stability. The collaborative ecosystem should also accelerate the realization of smart city from the government, technology actors such as companies and start-ups, and the community.

Public services applications that the people of DKI Jakarta most widely use include the JAKI application, Alpukat Betawi, and Online Tax. Generally, people feel a change due to the digital transformation in public services, specifically during the pandemic. Based on the results of the Jakarta Smart City BLUD study in terms of residents' responses to digitally-based public services, the most widely used services were population administration (62.9%). However, after COVID-19 pandemic, health services are most widely used, followed by population administration at 49.6%. This situation shows that the pandemic has indirectly affected people's habits or activities, regarding the use of digital health services.

In addition, a transformation of the arrangement and allocation of spaces in DKI Jakarta has also been conducted. The Provincial Government of DKI Jakarta also regards future spatial development considering disaster-resilient spatial planning. The spatial planning is expected to withstand future non-natural disasters such as pandemics. The concept should focus more on public spaces used as hospitals when non-natural disasters occur. Additional anticipations will be stated in the building planning regulations, providing comprehensive specifications for ensuring resilience to natural and non-natural hazards. These details include elements such as disaster-resistant structural design, clean water networks, adherence to the single-loaded corridor concept, effective ventilation systems, and various other considerations.

The response to the spatial policy of the Province in dealing with the pandemic is realized in the forms of 1) directing the development of the city into a mixed area, 2) reviewing minimum standards, 3) providing inclusive and integrated public spaces, 4) providing spaces for UMKM (*Usaha Mikro Kecil Menengah*/Micro Small Medium Enterprises) and other informal sectors, and 5) giving directions for digitally-based city development (Results of In-depth Interview, 2021). The challenge in spatial planning is how to prepare green open spaces as evacuation rooms for emergency conditions and build disaster-resilient areas. The Provincial Government of DKI Jakarta has arranged public spaces with a health protocol method, minimized the development of slum areas, and optimized the JAKI application.

Since September 2022, various public spaces have been reopened and operating normally as before COVID-19 pandemic. Generally, one of the changes as an effect of the pandemic related to the conditions and use of public spaces is the increasing demand and public awareness of environmental and individual health. The government of Indonesia decided to implement a new normality, which is the implementation of

Table 1. Digital Transformation in the Provincial Government of DKI Jakarta

Before	After	Implementation
Work and meetings in the office/ special room	Flexible working spaces and online meetings	Meetings, coordination, and socialization via online
Manual office administration	e-office with Electronic Signature (TTE)	Official letters, decrees, and certificates using TTE
Manual public services	Online public services	Online licensing
Tall organization structure (echelon IV structural officials)	Flat organization structure (functions and coordination by functional officials)	Position arrangement through the equalization of JA to JF
Manual work culture	Digital work culture	Working and doing activities using applications
Activity-based performance management	Agile performance management	Performance determination through SAKIP

Source: In-depth Interview, 2021

health protocols while restoring the conditions and activities of residents. Therefore, an effort to implement the new normality and the application of the health protocol are the main factors in changing the function and use of public spaces.

The complexity of a city demands a balance of urban environment, such as green open spaces. Referring to Law No. 26 of the Year 2007 article 29, every city in its regional spatial plan must allocate at least 30% of its territory for RTH (Ruang Terbuka Hijau/Green Open Spaces (GOS)). In addition, green open spaces become an alternative to taking advantage of holidays. At Jakarta Pusat, approximately 1200 GOS consist of green belts, urban parks, forests, community gardens, and cemeteries (Pemerintah Provinsi DKI Jakarta, 2022b, 2022a). There are several functions of public spaces such as child-friendly integrated public spaces (RPTRA), sports facilities (Menteng Park and Gelora Bung Karno Arena Main Stadium), family tourism and recreation (The National Monument (Monas), Lake Sunter, and Old City), as well as a co-working spaces/creative hub (M-Bloc). Each function is subjected to changes related to the response and adaptation process depending on (i) visitor characteristics, (ii) operators, (iii) infrastructure condition and availability, and (iv) accessibility. The characteristics of each observed public space can be seen in the matrix in Table 2.

During the pandemic, RPTRA was closed and various activities in RPTRA for children had to be stopped. Therefore, many children lost space to play around and interact with one another. In terms of institutions, RPTRA is managed directly by the Government of DKI Jakarta through the governing body in each *kelurahan* (city village). Through such institutional forms and structures and direct instructions, the structure can be transformed into a vaccination center. The operator functions as the pandemic response team that supports local health centers in giving vaccines. During the pandemic, RPTRA functions and services are carried out to become spaces for children's activities through ICT support (Rustanto, 2021; Rustanto & Akhmad, 2021). This is in line with the results of in-depth interviews with RPTRA managers as follows.

> *"During the pandemic, the RPTA was closed, but it was used for vaccinations or to accommodate CSR aid related to handling COVID-19," Informant A-Jakarta*
>
> *"RPTRA is to serve vaccinations throughout Indonesia, coincidentally now it is PPKM (Pemberlakuan Pembatasan Kegiatan Masyarakat/Implementation of Restrictions on Community Activities) level 1 hence we are still open for public services and vaccine services but visitors are still limited" Informant B-Jakarta*
>
> *"Before the pandemic, the RPTRA was very busy because there were lots of children around it who did not have a place to play. During the pandemic, the RPTRA was closed for public services, but the management still came in to maintain the place," Informant C-Jakarta*

The presence of the pandemic has become a big momentum for the government to revitalize parks in Jakarta. Tebet Eco Park is designated as a Low Emission Zone (LEZ) area, and visitors are expected to take public transport (Tebet Eco Park, 2022a, 2022b). City parks as public spaces play an important role in harmonizing healthy urban life patterns (Wibowo & Ritonga, 2018). Gelora Bung Karno Stadium and Menteng Park, categorized as public parks, are considered legendary in Jakarta (Nursanto, 2011). Banteng Field Park has a high historical value with the monument of the liberation of West Irian (Martini, 2014). Meanwhile, Suropati Park is an example of a public open spaces used for sports facilities. Besides being used for sports facilities, Banteng Field Park is mainly used for family recreational activities, running certain events such as flora and fauna exhibitions as well as children's playgrounds and sports activities.

Table 2. Characteristics of Public Spaces in Jakarta by Function

Aspect	RPTRA (*Ruang Publik Terpadu Ramah Anak*/ Child-friendly integrated public spaces)	Sports Facilities	Tourism and Recreation	Coworking Spaces/ Creative Hub
Visitors	Specific and small in number	Public and big in number	Public and big in number	Specific and big in number
Shapes and Size	Closed and small	Open and huge	Open and huge	Semi-open Medium
Activity	Child's play, fun learning	Sports	Tourism, recreation	Meeting, hanging out
Management / Operator	City Government	Government Enterprise	Agency for Public Services	Private management
Infrastructure	Reading room, child's play, and park (see-saw, slide, swing)	Jogging track, sports field	Heritage buildings, monuments, shops, photo spot	Coffee shop, food, and beverage stalls
Examples	RPTRA Kebun Sirih, RPTRA Gondangdia	Gelora Bung Karno Arena Stadium, Menteng Park, Banteng Field Park, Suropati Park, Dukuh Atas	National Monument, Kota Tua, Tebet Eco Park, Banteng Field Park, Lake Sunter	M-Bloc

Source: Field Observation Result, 2022

The changes found in Menteng Park are the addition of a playground for children, a statue icon, a garden improvement, and the presence of a literacy area in the form of a mini library. Besides Menteng Park, Dukuh Atas has become a location where open spaces are formed due to the Car Free Day. The concept answers the global issue of the urban environment by setting streets in major city, for a certain period, to create new social activities in spaces (Prasetyo, 2017). Dukuh Atas, located next to Sudirman Street, in the heart of Jakarta, lines up numerous shopping and office centers, every Sunday, Sudirman Street is closed for Car Free Day.

Other examples of public spaces that have experienced changes due to the pandemic are those for tourism such as Monas, Old City, Tebet Eco-Park, and Banteng Field Park. The large size and large numbers of visitors lead to challenges in implementing the new normality compared to RPTRA, which is specifically planned for children. Therefore, the coverage of visitors is more general, with a significant number of visits. This has become an aspect that has received attention due to the impact of the pandemic by implementing restrictions on motor vehicles to reduce pollution and emissions (Setiawan et al., 2020). In particular, the area of GBK also has 84% Green Open Spaces with a 67.5% green environment, full of rare trees, serving as home to 22 species of wild birds. Meanwhile, Banteng Field Park is relatively more crowded, specifically at the dancing fountain lighting show held on Saturday and Sunday nights. After two years of inactivity, the show reopens on June 18 and 19, 2022 (Pemerintah Provinsi DKI Jakarta, 2022b, 2022a). This is in line with the results of in-depth interviews with visitors/tourists at the attractions as follows:

> *"Before COVID-19, there were lots of visitors, many for sports activities, lots of people selling, making the location dirty. During COVID-19, it was more comfortable because it was cleaner. Currently, many changes have been made and no one is selling," Informant D-Jakarta*
>
> *"Furthermore, there used to be a lot of visitors, now there are fewer. It used to be busier before COVID-19. Currently, the place is cleaner, fresher, and more comfortable." Informant E-Jakarta*
>
> *"Saturdays and Sundays are usually crowded, parks are not as good as now, open spaces are not as good as after the pandemic before they were not as beautiful as now. Currently, the DKI provincial government is busy promoting city parks and open spaces," Informant F-Jakarta*
>
> *"Before COVID-19 pandemic, there was a lack of public spaces, so the pandemic has increased these open public spaces, after the pandemic we have added new public spaces"Informant G-Jakarta*

Other public spaces directly affected by the pandemic are co-working spaces or creative hubs, as shown in Table 3. The pandemic causes a work-from-home style that directly impacts the flexibility of the workplace and the use of ICT (Rachmawati, et al., 2021b). Simultaneously, the presence of co-working spaces as a workplace is also marked by the virtual spaces supported by digital infrastructure (Eriya et al., 2020; Rachmawati, et al., 2021a). WFH model encourages Jakarta residents to move their workplace (working space) to public spaces such as co-working spaces and coffee shops (Dewi, et al., 2022). Co-working spaces also become the symbol of a more relaxed and organic work atmosphere. The adaptation ahead of the new normality is strengthened by the implementation of strict health protocols as well as adaptation to business patterns and branding (Setiani et al., 2020).

The aspects that require attention are the increasing use of ICT and the need for smart dimensions in changing the function of public spaces in Jakarta and other parts of the globe (Sepe, 2021). The adaptation process of urban communities facing the pandemic, specifically in Jakarta, requires innovation (Rachmawati, et al., 2021b), such as ICT. The presence of a virtual office has significantly encouraged the role of co-working spaces as a facility for residents to work and simultaneously welcome the era of new normality. The use of ICT can also be viewed from the implementation of health protocols using applications such as *pedulilindungi* and JAKI. Concerning the provision of public spaces, the JAKI application will also be developed with a booking feature for public space visits. This is conducted to accommodate the community's need for public spaces by limiting the number of visits for the implementation of the post-pandemic health protocols. In addition, ICT infrastructure found in public spaces includes public Wi-Fi. Free Wi-Fi facilities can also be accessed on the JAKI Application. This public Wi-Fi facility is free to access, and all visitors can access the platform at no cost, without entering a password.

In the future, there will be more awareness programs on online-based service systems for most layers of society to support the implementation of Jakarta Smart City. Furthermore, the increasing number of public spaces can support air circulation and social interaction in society. The integration of the transportation system will reduce traffic congestion to decrease air pollution. The addition of public spaces and the good maintenance of the existing public spaces or parks are inevitable.

3.2. Case Study of the City of Paris

COVID-19 pandemic in France is divided into several waves (INSEE, 2021; Lallier, 2022), namely (i) First Wave (January-May 2020); (ii) Second Wave (September 2020-February 2021); (iii) Third Wave (March-June 2021); (iv) Fourth Wave (July-October 2021); (v) Fifth Wave (November 2021-February 2022); and (vi) Sixth Wave (Spring to June 2022). The strict limitation of activities in France was conducted during the first wave, followed by others. The first lockdown was declared from March 17 to May 11, 2020, during which people were only allowed to leave the house for specific purposes and various fines could be imposed. During the fourth to sixth waves, several efforts were made but not as frontally as in the first wave. The pandemic has consequences for the socio-economic life in Paris, marked by a decrease in production, factory closure, a reduction in the supply of services, and decreases in tourism demand, transportation services, hotels, and restaurants. Paris was the second most visited tourist city in Europe in 2019 (Statista, 2020), from 20.5 million visitors per month in 2019 to 13.6 million in 2020 (INSEE, 2022). The lowest number of visitors was 1.2 million in April 2020. This is related to the ban on foreigners going into the country in the first wave, as evidenced by the reduction in rail traffic by the French Railway Company (*La Société Nationale des Chemins de Fer Français*-SNCF) up to 50% of the usual capacity. This was followed by a very rigorous land frontier control until June 15, 2020. In the tourism sector, the pandemic hit small traders and retailers in various tourist destinations, such as the Musée du

Table 3. Public spaces Transformation in Post-Pandemic Jakarta

Aspect	Before the Pandemic	During the Pandemic	Current Condition (Post Pandemic)
Accessibility	Free access	Closed, fully locked down	Registration for tracing using a government application (pedulilindungi/care for protection)
Use	Social activities and games for children (RPTRA), sports facilities (GBK), and tourism (Old City)	Center for vaccination and virtual office	Sports facilities Center for vaccination Recreation and picnic Virtual office
Cleanliness and environmental aspects	Limited trash cans and cleaning men, lack of cleanliness awareness among visitors	Closed, fully lockdown	Extra trash cans
Zone Arrange ment	Regular, no special arrangement	Planning and efforts to revitalize and adapt to the new normality.	Implementation of LEZ with the restrictions on motor vehicles
Infrastructure and Facilities	Regular, no special infrastructure and facilities	Preparation of the new normality-supporting infrastructure and adaptation to post-pandemic health protocols	Extra hand washing facilities and accessibility like entrances

Source: In-depth Interview in an Open Public space friendly to children, Gelora Bung Karno, Old City, Lake Sunter, Menteng Park, Banteng Field Park, M-Bloc Co-Working Spaces, 2022

Louvre and Eiffel Tower, as well as supporting tourism sectors, such as hotels. The closure of the museum in early March 2020 was due to the pandemic (Franceinfo, 2020; Reuters, 2020). Initially, it was not the government policy, but an initiative from the respective worker union. The museum was reopened in July 2022 with a limited number of visitors. This condition triggered protests from those whose jobs depended on the visitors to the museum, including the owners of gift shops, cafes, hotels, and tour guides. More than 70% of visitors are foreign tourists, hence the restriction becomes a big obstacle for the museum and the operators of its supporting facilities. The situation would only gradually recover at the beginning of 2021 when France started to ease the country's lockdown. However, the situation until mid-2022 is not entirely back to normal. The number of tourists is still low when compared with the number before the pandemic in 2020 and 2021. The number of tourists to the Musée du Louvre was only 2.7 and 2.8 million compared to 9-10 million in the previous years (Statista, 2022). The pandemic also has an impact on travel agencies since no tourists visited. Bars and restaurants have also been hit but took advantage of the presence of the local people (CNEWS, 2020).

The restriction of outdoor activities as a strategy to minimize transmission certainly impacts the community's use of public spaces and services. Therefore, this study identifies the efforts made by the city of Paris in adapting the uses of public spaces and services by examining ICT use, spatial planning, and the environment. From the in-depth interview, informant H & I explained how the condition of restriction affected their daily activities and the general condition.

> *"I think it was necessary (the restriction of outdoor activities), I understand the government decision, it was hard. I remembered were on the balconies. That was the only moment we were out except the supermarket… we could like to have an hour of walking every day but it was only one kilometre away from the house" Informant H-Paris*

> *"During COVID-19 everything was empty. But, you know the young people the ones that can cross barriers and be against the law, sometimes they just go and chill out. But to be honest, in general, nobody went, everybody was afraid. After COVID-19, stay but there was no curfew people didn't want to go there they were not motivated they didn't want to go out anymore there was this kind of feeling that you want to stay at home" Informant I-Paris*

A restriction was experienced as an effort to enforce physical distancing. This measure was difficult at first time but people in Paris had started to adapt to the situation. Regarding the use of ICT for handling the pandemic, France has widely adopted the behavior of physical distancing using ICT. These include (i) the website https://cnam.briserlachaine.org/accueil (*Briser La Chaîne*/Break the Chain) created by the Non-Governmental Organization https://cnam.briserlachaine.org/accueil (*Briser La Chaîne*/Break the Chain) http://www.bayesimpact.org/ to break the chain of contamination. This is achieved by result out with whom the infected person has been in contact to avoid spreading the virus, (ii) COVIDom application used by *Assistance Publique-Hôpitaux de Paris* (APHP) making it possible to monitor the patients in self-isolation (APHP, 2020; Nouveal, 2020) and (iii) the mobile application TousAntiCOVID or Stop COVID available on the Apple Store and Google Play since June 2, 2020. On the 2nd of July 2021, people's access to places or public events including a large number of participants, such as recreational

activities, trade fairs, or exhibitions, may have been subject to the presentation of negative screening results, known as Pass Sanitaire (TousAntiCOVID application). However, from the 1st of August 2022, all policy rules regarding COVID-19 have been ineffective (Sante Publique France, 2020; Vie Publique, 2022).

The use of ICT mainly was for online socio-cultural activities. In April 2020, the city of Paris launched the "Que Faire à la Maison" (What to do at home) initiative, offering virtual and online experiences, such as sports activities, exhibitions, concerts, children's activities, or visits to museums (Graziella & Gabriella, 2022; Laurent & Rizhlaine, 2021). The city of Paris also carried the digital revolution through different digital applications to support innovative water and waste management, smart transportation systems, and energy. An application related to the city also includes the following features: (i) Urban mobility, for example by using the parking applications *PayByPhone*, *Parknow,* and *Flowbird*. Therefore, it is easy for drivers or motorists to pay for the parking fee in Paris (Ville de Paris, 2022b), bicycle use application (https://www.velib-metropole.fr/), motorcycles and cars called Mobilib' (via Communauto, Getaround, Ubeeqo apps), and public scooters (via Dott, Lime, TIER apps) (Jeannot, 2018; Ville de Paris, 2022c); (ii) Financial services through a wide variety of *neobanks* and mobile banking services in France (iii) *E-governance* (an application for receiving government services or different social initiatives), for example the France Connect site https://franceconnect.gouv.fr/ (*FranceConnect* is an online identification and authentication services, run by the French Inter-Ministerial Digital Department) (European Commission, 2016), (iv) Shopping and delivery applications provided by various private companies from France and abroad such as Monoprix, Houra.fr, Dija, Deliveroo (Browne, 2021; Statista, 2022), (v) Health services application, for example through the website of the national health insurance https://www.ameli.fr/ or additional *(mutual health insurance)*, (vi) Short term rental (booking application). Almost all essential and practical information about the city of Paris can be found on the very informative website https://www.paris.fr/. The convenience of getting information is also an important aspect of e-governance (Jeannot, 2018).

Concerning spatial planning with the increasing price of land, housing in Paris is relatively narrow (Bunel et al., 2017). On average, housing in the city of Paris is vertical and in the form of apartments. The consequence is that spaces in the house are narrow, and the people need public spaces. COVID-19 pandemic causes tremendous psychological pressure for individuals living in apartments and increased awareness of the importance of public spaces (In-depth interview, the 21st of July 2022). Lacking access to outdoor facilities, living unaccompanied, or living in dense settlements can cause poor mental health during a lockdown, such as loneliness, anxiety, and low life satisfaction (Keller et al., 2022). Therefore, physical exercise became one of the important activities in tackling stress during confinement in France (Bourion-Bédès et al., 2021) as confirmed by informant J.

> *"I used my bicycle and I was, I made you know, the tour of my block and that was something" Informant J-Paris*

Bicycles became a necessity in the pandemic situation enabling people to have physical activities while in touch with the outdoors. Therefore, an adequate supporting infrastructure for bicycles and other physical mobility is necessary. Between 2017 and 2019, a bicycle lane called Plan Vélo was constructed in Paris (Daniele et al., 2022). Plan Vélo Paris https://planvelo.paris/ is an ambitious city plan where every street and bridge will possess a bicycle lane by 2024, eliminating 72% of on-streetcar parking spaces (Paauwe, 2021). In the aftermath of the lockdown, the French Government has launched a 20-million-euro ($22 million) package to spur post-lockdown cycling, including a 50-euro subsidy for bicycle repair or tuning (Archambault, 2020; Henry, 2020). During COVID-19, convenience was also given to Ile-de-France residents. Individuals were asked to leave their vehicle in the relay or city parking lot at a low fee. Access to the car park will be free for the holders of the Navigo Pass (a weekly and monthly subscription ticket to access public transport system in France, with the coverage of the city of Paris and its buffer areas in the le-de-France region (RATP Group, 2017)). This is cheaper than a subscription fee of 75 euros per month at regular times. Free tickets have been promoted to increase the use of public transport in Paris. In the school year 2020, free public transport was offered for under-18s (Yeung, 2021).

To minimize the transmission spread of COVID-19, the national, regional, and local governments urge companies to provide opportunities for workers to keep working from home (MP France3, 2020). The French government has a national mobility program through partnerships and collective methods designed to support the experimentation and deployment of real projects fulfilling the mobility needs of residents known as France Mobilité https://www.francemobilites.fr/. At the regional level, the city of Paris also has a website https://www.iledefrance-mobilites.fr/ to easily access all information related to mobility by public transport. France's national state-owned railway company (SNCF) also provides information on mobility from Paris to other cities, regions, and countries through its application https://www.sncf-connect.com/ (SNCFConnect, 2022). The City Government also has a smart Transport Program following the Paris Declaration, 'City in Motion: People First' (UN. ECE, 2015), stressing smart transportation for sustainable development.

In connection with the environmental aspect, the pandemic, causing a public health emergency, has urged the city to redefine the provision of services, expand spaces, and move back to economic growth, assuming sustainability. Several efforts to deal with environmental aspects are changing the appearance of the 35-km-long city ring road from a "grey belt" to a "green belt", planting a total number of 70,000 trees, reducing the number of traffic lanes from 4 to 3 (Everett, 2022), creating areas neutral to carbon, such as Saint-Vincent-de-Paul, becoming the first urban project with a carbon-neutral goal, promoting access to water, marked with the installation of 40 new fountains in public spaces, and preserving urban forests (Bois de Boulogne, Bois de Vincennes, 500 parks and gardens) (Ville de Paris, 2022a). The information on reducing carbon footprint by traveling is also promoted through websites of public transport (Île-de-France Mobilités, 2021; SNCFConnect, 2022). COVID-19 pandemic has also led the government to provide a home for homeless people in several hotels (Roederer et al., 2021; The JakartaPost, 2020) where the government subsidizes the cost.

3.3. Case Study of the Bucharest City

In 2021, the Romanian government grappled with numerous challenges precipitated by the pandemic. These

included the emergence of a new virus variant, a suboptimal vaccination rate among its population, strain on the healthcare system, and concurrent political instability (Túri et al., 2022). Therefore, the pandemic handling is only considered successful when the members of society comply with the measures that the government has taken, and consequently have conveyed them to its subjects since high trust is of primary importance (Túri et al., 2022).

During the pandemic, the city of Bucharest applied two status stages, 'alert' and 'emergency'. 'Emergency' was equivalent to lockdown, while 'alert' had several stages and restrictions were prone to changes. At the final 'alert' stage, the health protocols and prevention of transmission are at the stage of appeal. Residents were advised to maintain social distancing and wearing a mask is only a recommendation.

The President of Romania declared the 'emergency status' for two months, on the 16th of March 2020. This was maintained when the transmission was becoming high, and the health system in the city of Bucharest began to be overwhelmed with patients who needed hospitalization. Therefore, many patients were referred to other hospitals, out of Bucharest. During the 'emergency' period, the city authorities forced its residents to stay at home, except for well-justified emergencies. To enter or cross the city, people must fill out an online form. The status was adjusted to 'alert' and was maintained until the 9th of March 2022 when the number of cases decreased (this has various stages of measures depending on the number of cases per population) (In-depth interview, the 25th of July 2022).

Romania is intensively upgrading its network infrastructure to expand the coverage and Internet connectivity in the country. For example, the application developed by the government (vaccinare-COVID.gov.ro) works to manage COVID-19 vaccination by determining schedules, making appointments, and showing vaccination certificates. The government fully supports the digitization process, even though online public services are still limited (Całus, 2021).

There is no specific use of applications from the government for handling the pandemic. In Romania, tracking is conducted on a limited basis by filling out online forms. Treatment is carried out through ordinary telephone lines when a member of the community experiences mild symptoms. In an emergency, a telephone connection is used to dial the general number (112). However, during the restrictions, major private healthcare operators and some public hospitals launched telemedicine services providing medical assistance for free. This was achieved through online platforms, such as Virtual Clinic, MediCall, Dr. Sanador, video calls, or voice calls (ArcadiaLine, Intermedicas, Doclandia).

Although services represent a solution that facilitates the population's access to medical services with lower costs, telemedicine is not institutionalized in Romania. National health authorities set up plans to update legislation to expand these services following COVID-19. The use of ICT and the equitable development of the telecommunication network infrastructure could help the community adapt to the tight pandemic quarantine situation in accessing the campus library online for students, the government services, and the banking system through *mobile apps*. The provisioning services for daily needs are carried out by the private sector, such as large-scale retail companies (Carrefour, Mega Image) and delivery apps including Glovo, Uber Eats, and Bringo. Financial activities also rely on online applications provided by most banks. Raid-hailing companies such as Uber and Glovo also drove the growth and development of smart economy. Informant K, a student in Bucharest stated how people coped with the restriction using smartphone applications.

> *"We have an application on the bank and was not a problem to get a transfer to another person. Therefore, when we want to buy something we just call for Glovo." Informant K-Bucharest*

Besides e-banking and Glovo as a goods delivery app, Bucharest also strengthened its E-government strategy. E-government was initiated through the program Ghiseul. ro, (Payment desk) in 2011 (Całus, 2021). However, it is still hampered by public distrust of the online payment system or due to elders' limited digital competencies. The government also simplifies the electronic procurement system during the pandemic to ensure that development activities stay in progress (Preda, 2020). COVID-19 handling was influenced by the geopolitical condition of the war in Ukraine. The Romanian government opened its border gates to accept refugees from Ukraine and the authorities focused on helping the people, mostly women and children fleeing the war. This happened in the towns near the border and big cities, including the capital city of the country.

Outsiders and users of local telecommunication providers benefitted from various Internet network-based public services. Since the war broke out in the neighboring country, many refugees have arrived from Ukraine, and there are free roaming services for the users of mobile communication providers. However, internet-based application use has increased, due to the acceleration of digitization in various public service sectors, such as education, health, taxation, licensing, and even recreation. Various features are maintained even though movement restrictions have ended, because of the significant time efficiency, specifically in the registration process.

Bucharest has many well-known public recreation spaces, including city parks (Herăstrău, Carol, IOR, Drumul Taberei, The Botanical Garden), commercial areas/corridors/boulevards (Old Town, Calea Victoriei, Magheru Bulevard, Regina Elisabeta), and plaza (Piața Unirii, Piața Constituției, Piața Universității, Arcul de Triumf). All public recreation spaces were closed during the lockdown period (March-May 2020). The use of public spaces with standard capacity and functions was only allowed since March 2022. There is no significant change between the number of visitors before and after the pandemic (as of March 2022). Informant L, a student in Bucharest stated the condition when the restriction was started in Bucharest.

> *"All the people were like nothing was going on, it was normal for the first time, and no one was wearing a mask in the face. But after that, there was a restriction. It was very difficult after that because it's just uncomfortable to take it for eight hours or something more than that on your face." Informant L-Bucharest*

During the pandemic, several historic buildings were restored, and trees were trimmed neatly, leading to an impact on improving the quality of Bucharest's urban landscape. This can be conducted as an advantage of the limited number of visits. Additionally, the visitors are more concerned about

personal spaces and strain to keep their distance from others. This trend gradually decreased in 2022, and visitors returned to their pre-pandemic habits. In addition to being for recreation, public recreation spaces were also used as a mobile hospital and COVID-19 test location (testing center).

In 2022, the Ministry of the Environment launched a new mobile app that people can use to monitor air quality. The application is called CalitateAer (AirQuality) and can be installed on the phone freely. The application analyses four indicators from monitoring stations, including PM10 and PM2.5, and residents are informed where and how seriously the air quality is impacted by pollution in the city area. An 'Integrated Air Quality Plan' for the city will also be developed.

(https://www.romania-insider.com/romania-air-quality-monitoring-app-oct-2022)

Public transportation in Bucharest consists of several types, for example, trams, buses, and metro/subway. During the pandemic, the transportation sector stressed the importance of implementing health protocols by imposing that passengers must wear masks and hand wash using disinfectants (Tudor, 2021). A report from Vegacomp Consulting (2021) stated that the pandemic condition accelerated the implementation of smart mobility (Vegacomp Consulting, 2021). Commencing on August 1, 2021, the transportation infrastructure across the Bucharest-Ilfov Region was subjected to a transformative shift with the introduction of metropolitan lines. This innovative concept integrates urban, regional, and express lines, with the Metro. In Bucharest, commuters have the option of using 'Metropolitan passes' or 'Integrated Metropolitan passes,' including diverse modes of surface transport and the Metro, such as trains to Otopeni International Airport. Conveniently, passengers can facilitate fare payment through contactless bankcards, SMS, or the 24Pay mobile application. (https://www.stbsa.ro/eng/24pay_eng).

In many instances, the development of residential spaces was not accompanied by adequate infrastructure, new neighborhoods developed in the outskirts still need facilities such as paved roads, sewage systems, or socio-cultural facilities. In addition, traffic jams during peak hours or bad weather conditions are among the most visible problems, stressing the need for more efficient spatial planning strategies (Dumitrache et al., 2016).

The government supports micro-mobility by providing infrastructure for pedestrians and non-motor vehicles. Meanwhile, the provision of facilities includes the private sector by running electric scooters and bicycle rental services available at strategic locations in every city corner. A total of four providers operate electric scooter rental services, namely Lime, Bolt, Uber, and Splash. The users can access these facilities using a mobile-based application, and they do not need to return the vehicle used. As a result, the flexibility of micro-mobility facilities based on electric battery and non-motor vehicles significantly increased the number of users.

The pandemic challenged the education system, forcing the authorities to find alternatives to face-to-face instruction. Consequently, on 24th of March 2020, the Romanian Ministry of Education (MER) launched an e-learning platform Educred.ro, intended to connect various digital resources designated for primary and secondary education (Primar Educred and Gimnaziu Educred). This design was built with the support of European funds for teachers and pupils access. The web-based application CRED (**'Curriculum relevant, educație deschisă pentru toți'**/Relevant Curriculum, open education for all) also provides various digital references supporting online learning activities. This system enables the operation of various online meeting applications under the license of Google and Microsoft, for free, including Teams/Office365, Google Meet, Zoom, Liveresq, and Google Classroom. A group of NGOs in partnership with MER also conducted training on using digital learning systems for teachers (OHCHR, 2020). For further coverage of services, MER also cooperates with the Romanian Public Television Station (TVR) to provide broadcasts related to school subjects, specifically for grades 8 and 12. Therefore, the continuity of students' preparation for the national exam can be maintained. The program is entitled 'Teleșcoala '(Tele-School) and has been running continuously since March 2020 (OHCHR, 2020). Transition to online learning, within a short period, was achieved in most leading universities as e-learning platforms (Dumitrache et al., 2021).

There are several key factors to consider at the national level to successfully manage an outbreak such as COVID-19 (Túri et al., 2022); Innovative monitoring systems provide a variety of information available to support decision-makers in taking appropriate actions for risks. Furthermore, it is necessary to create and enforce laws and regulations to reduce the spread of false information. The healthcare system should be prepared for the stresses generated by the pandemic wave, and the suspension of services can be prevented.

3.4. Case Study of Canberra

The Australian Government started responding to COVID-19 pandemic on the 21st of January,2020, by restricting international arrivals to avoid spreading in the country and before Public Health Emergency of International Concern announcement from WHO (Higginson et al., 2020). The federal government also imposed strict social distancing and self-quarantine measures on the infected people. On the 29th of March 2020, public event permitted to 500 people was limited to only two persons. Australians were also suggested to stay and WFH and only travel under critical circumstances such as shopping, medical treatment, or working out.

According to the Department of Finance, COVID-19 restrictions took a heavy toll on Australian revenue, about $1,4 billion per week. In the first quarter of 2020, a 0,3% contraction of Gross National Product was registered, which impacted the economic growth to only 1,4% (Higginson et al., 2020). Data from ACT showed that from March 2020 to November 2022, COVID-19 cases reached 212.092 with 129 dead casualties. The vaccine for those above 16 years old has covered 78,5% of the population (ACT Government, 2022). At Canberra, the number of casualties was considered low due to the reduced density of the population.

Limitations to activities, which are subjected to curb the spread, surely affected access to public spaces and services.

From the aspect of information and communication technology, the Government of the Australian Capital Territory (ACT) in Canberra provides a website https://www.COVID19.act.gov.au/. This platform contains centralized information regarding statistics on the number of cases, procedures for protecting oneself from contracting the virus and keeping a safe distance physical appearance in public places, procedures for carrying out the tests, medical treatment procedures, and access to obtain vaccines.

The Australian Federal Government created COVIDSafe app to slow the spread and find people in close contact with infected individuals. After a positive COVID-19 test result,

the respective state or territory health department will seek authorization to upload digital information to the National COVIDSafe Data Store. Subsequently, contact will be initiated to guide necessary actions. On 14 May 2020, the Australian Parliament passed the Privacy Amendment (Public Health Contact Information) Act to support COVIDSafe app and protect users' privacy. The use of social media platforms such as the government's official Facebook account, namely ACT Health, can be accessed on the website https://www.facebook.com/ACTHealthDirectorate/. This makes it easy for the people of Canberra City to obtain updated information regarding the condition of COVID-19. To be precise, an informant M in Canberra suggested:

> *"They also have a Facebook page, ACT Government is pretty good at giving you information (COVID-19 update) at that time" Informant M-Canberra*

During COVID-19 pandemic, the ACT government required the public to download the Check-in CBR application on their respective cell phones. This application must be used when people visit public spaces, which has their QR code to be scanned. Therefore, contact tracing can be carried out immediately when cases are significantly increased in certain public spaces. This was confirmed by informant N and O in Canberra:

> *"It (the Check-in CBR app) was just check-in, and it was mentioning when there any hotspots and contact tracing information, it was all about that app" Informant N-Canberra*

> *"There was always like a QR code that you have to scan outside a shop, so can keep check of people with COVID-19 and stuff" Informant O-Canberra*

From the spatial planning aspect, the city of Canberra is an example of good 20th-century planning and was designed as the country's new capital based on the central principle of a garden city. Furthermore, the city was developed around a triangular main function. The southern part of Lake Griffin functions as a government zone, while the other two sides of the triangle are dedicated to city functions (Muminovic, 2016). As a compact and efficient city, the continued development of Canberra ensures increased diversity of activities and good quality of life for the people. This method of developing the city in the future will increase accessibility and connection between spaces used to live, work, study, shop, and access services. The pandemic has changed daily activities by implementing the new normal, including daily work activities. The experience has led the ACT Government to promote the creation of two types of collaborative spaces through smart work, namely virtual and physical collaborative spaces.

There are two main options for managing urban growth, namely Infill (also referred to as urban renewal) and Greenfield development. Infill development includes increasing the capacity of existing urban areas to support growth. This requires strategic identification of areas where development can be focused, including urban intensification, City Centers, city center transit corridors, and clusters of high accessibility (ACT Government, NA).

Canberra is a connected digital city with the most extensive free public Wi-Fi program called CBRfree. Furthermore, CBRfree is Canberra's public Wi-Fi network and one of Australia's largest free public Wi-Fi implementations. This is part of the ACT Government's commitment to the future as a smart, connected digital city. With this Internet connection facility, people can easily carry out their daily activities, when schools and offices implement remote learning and work. The CBRfree Wi-Fi network can also support various smart city initiatives that benefit the ACT community, including smart parking and CCTV. Informant P in Canberra stated that

> *"I know that Canberra has free Wi-Fi in public areas, and I know that Canberra has networks on some of their street lighting. I used to work on it" Informant P-Canberra*

From the environmental aspect, local green spaces have become a place of entertainment for Canberra residents during the lockdown period, with more than half spending time there. Libraries, playgrounds, open-air fitness locations, and BBQs are open for visits to help social recovery. The ACT government continues to maintain and improve public open spaces infrastructure, such as providing additional seating, trash bins, and drinking water throughout Canberra. This includes introducing new facilities that make ACT a highly livable city and ensuring facilities are easily accessible to all residents. Improvement of public spaces aims to encourage the use and enjoyment of public spaces by all members of society, including persons with disabilities, people from diverse cultural and linguistic backgrounds, parents, indigenous peoples, youth, and families.

According to interviews, public spaces during COVID-19 pandemic were emptier compared with the pre-pandemic period. Besides the restrictions on public activity, WFH policy also affected the conditions, specifically in the city center of Canberra, which is closer to the government office. Informant Q in Canberra confirmed that.

> *"I think public spaces in Canberra during COVID-19 pandemic were a little less crowded than before. It is because people were working from home" Informant Q-Canberra*

The informants mentioned that COVID-19 pandemic did not heavily hit Canberra, due to the lower number of its population relative to other states in Australia. Most of its residents accessed the latest information and policy regarding the Pandemic from the ACT government website. A change that could be noticed was the obligatory mask usage in all public spaces, hand sanitizer availability, and physical distancing in transportation.

Several people felt that transitioning from a normal life to an entirely online life required adjustment. In addition, some people could use the latest technology since an adaption was needed. The younger generation suggested that the change in online education was partially disadvantageous, specifically for individuals located far from the city center, school, or office.

In the recent transition into a new normal, several people thought that the policy and the condition of public spaces were drastically changed. As pandemic restrictions eased, public spaces witnessed a resurgence in visitation. Additionally, the stringent requirement for mask usage in both open and closed public spaces gradually diminished. Some people were worried about COVID-19 spread and still took precautions, specifically when new variants were formed. Annual events

and festivals resumed, mirroring a semblance of pre-pandemic normalcy, as organizers reinstated these gatherings.

Public transportation in Canberra is currently seen as needing to be more optimal and holistic. An aspiration regarding this system was the extension of the tram from North Canberra to the Southern area. A punctual bus schedule also became residents' expectations for future public transportation. Recently, some public areas have been poorly served by transportation, and people without private cars experienced difficulties.

4. Conclusion

In conclusion, COVID-19 pandemic was reported to drastically alter the entire livelihood of all people across the globe, including social interaction, technology use, as well as the perception and need for public spaces and services. From four capital cities, namely Jakarta, Paris, Bucharest, and Canberra, several underlying factors including the socio-economic condition, city design and urban planning, density, public transportation, as well as the presence of public spaces and parks influenced the pandemic dimensions.

Jakarta enforced a large-scale restriction and encountered difficulties in curbing the pandemic due to the high-density population and the economic factor where many people needed to work. Therefore, the city planned to conduct a city-planning transformation, to increase awareness of the environment and the health of its residents. Paris was also influenced by the economic factor and the settlement characteristics, where most residents lived inside limited spaces. This caused stressful conditions and appreciated the open spaces and parks. Furthermore, the authorities of Paris were inspired to implement the concept of a 15-minute city and build above hyper-proximity as the lesson learned from the pandemic. Bucharest seized the momentum to accelerate the digital transformation of the city and the nation on a broader scale. For the continuation, public services, specifically the healthcare system would be gradually transformed due to the pandemic. As a centre of government, Canberra could optimize its advantage from the low-density population, ICT application, and residents' obedience. Therefore, the death tolls were relatively lower compared to other states in Australia and the pandemic raised residents' awareness of the importance of integrated and comprehensive public transportation. Four cities show the urgency and necessity of urban transformation as the representation of physical and virtual spaces. Together, those two aspects compound future city design for a better living for people. Several policy recommendations and study opportunities were stated to strengthen public space planning and use of public services, namely: building public spaces to meet the needs of various activities, including the application of smart city technology, developing zoning plans considering the needs of residents, including green open areas, sports spaces, and community spaces, increasing the accessibility of public spaces, and building Technology-Based Public Spaces such as IoT sensors to manage pedestrian traffic, measure visitor density, and monitor the cleanliness of public spaces.

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References

ACT Government. (2022). *ACT COVID-19 statistics*. Australian Capital Territory (ACT) Government. https://www.covid19.act.gov.au/updates/act-covid-19-statistics

APHP. (2020). *Covidom : une solution de télésuivi à domicile pour les patients porteurs ou suspectés Covid-19 co-construite par l'AP-HP et Nouveal e-santé*. Assistance Publique - Hôpitaux de Paris. https://www.aphp.fr/actualite/covidom-une-solution-de-telesuivi-domicile-pour-les-patients-porteurs-ou-suspectes-covid

Archambault, C. (2020). *Paris to turn more streets over to bicycles as Covid-19 lockdown lifts*. France 24. https://www.france24.com/en/20200505-paris-to-turn-more-streets-over-to-bicycles-as-covid-19-coronavirus-lockdown-lifts

Barlow, M., & Levy-Bencheton, C. (2018). *Smart cities, smart future: Showcasing tomorrow*. John Wiley & Sons.

Bourion-Bédès, S., Tarquinio, C., Batt, M., Tarquinio, P., Lebreuilly, R., Sorsana, C., Legrand, K., Rousseau, H., & Baumann, C. (2021). Stress and associated factors among French university students under the COVID-19 lockdown: The results of the PIMS-CoV 19 study. *Journal of Affective Disorders*, *283*, 108–114. https://doi.org/10.1016/j.jad.2021.01.041

Branchi, P. E., Fernández-Valdivielso, C., & Matias, I. R. (2014). Analysis matrix for smart cities. *Future Internet*, *6*(1), 61–75.

Browne, R. (2021). *Apps that promise grocery deliveries in 10 minutes invade Europe as shopping shifts online*. https://www.cnbc.com/2021/05/12/getir-gorillas-and-dija-speedy-grocery-delivery-apps-invade-europe.html

Bryman, A. (2008). *Social research methods* (3rd Editio). Oxford University Press.

Bunel, M., L'Horty, Y., Du Parquet, L., & Petit, P. (2017). Les discriminations dans l'accès au logement à Paris: une expérience contrôlée. *Halshs-01521995*.

Całus, K. (2021). *OSW Commentary-Digitisation in Romania accelerates during the pandemic* (Vol. 409). OSW: Centre for Eastern Studies.

CNEWS. (2020). *Coronavirus : Les Bars Et Restaurants Parisiens Dans Le Rouge*. CNEWS. https://www.cnews.fr/france/2020-10-12/coronavirus-les-bars-et-restaurants-parisiens-dans-le-rouge-1007206

Daniele, F., Segu, M., Bounie, D., & Camara, Y. (2022). *Bike-friendly cities: an opportunity for local businesses? Evidence from the city of Paris* (No. 09; THEMA Working Paper N°2022). THEMA (THéorie Economique, Modélisation et Applications), Université de ….

Dewi, P. S. T., Susanti, A., & Putra, I. W. Y. A. (2022). The Transformation of Coffee Shops into Coworking Spaces During the Pandemic. *4th International Conference on Innovation in Engineering and Vocational Education (ICIEVE 2021)*, 272–278. https://doi.org/https://dx.doi.org/10.2991/assehr.k.220305.055

Eriya, Yuly, A. R., Adila, R. N., Nugrahani, F., Waluyo, Y. S., & Hammad, J. A. H. (2020). Working Space Virtual Office Prototype in Pandemic Era. *2020 3rd International Conference on Computer and Informatics Engineering (IC2IE)*, 388–392. https://doi.org/10.1109/IC2IE50715.2020.9274604

European Commission. (2016). *eGovernment in France*.

Everett, M. (2022). *How is the city of Paris adapting to climate change?* France 24. https://www.france24.com/en/france/20220827-how-is-the-city-of-paris-adapting-to-climate-change

Franceinfo. (2020). *Covid-19 : les salariés du musée du Louvre réclament des "mesures de prévention spécifiques", affirme la CGT Culture*. France Télévisions. https://www.francetvinfo.fr/sante/maladie/coronavirus/covid-19-les-salaries-du-musee-du-louvre-reclament-des-mesures-de-prevention-specifiques-affirme-la-cgt-culture_3850435.html

Gerring, J. (2006). *Case study research: Principles and practices*. Cambridge university press. https://doi.org/10.1017/S0022381607080243

Graziella, L., & Gabriella, J. (2022). *COVID: que faire à la maison pendant son isolement ?* Sortiraparis.Com. https://www.sortiraparis.com/actualites/a-paris/articles/267754-covid-que-faire-a-la-maison-pendant-son-isolement

Henry, C. (2020). *Déconfinement à Paris : Anne Hidalgo veut faciliter les déplacements à vélo et à pied*. Le Parisien. https://www.leparisien.fr/paris-75/deconfinement-a-paris-anne-hidalgo-veut-faciliter-les-deplacements-a-velo-et-a-pied-04-05-2020-8310735.php

Higginson, S., Milovanovic, K., Gillespie, J., Matthews, A., Williams, C., Wall, L., Moy, N., Hinwood, M., Melia, A., & Paolucci, F. (2020). COVID-19: The need for an Australian economic pandemic response plan. *Health Policy and Technology*, *9*(4), 488–502. https://doi.org/https://doi.org/10.1016/j.hlpt.2020.08.017

Île-de-France Mobilités. (2021). *Île-de-France Mobilités Green Bond Framework*. https://www.iledefrance-mobilites.fr/medias/portail-idfm/403255b5-fdcc-4744-a42c-1e28a8276546_FrameworkGreenbund_EN-110521.pdf

INSEE. (2021). *France, portrait social: Édition 2021*. Www.Insee.Fr. https://www.insee.fr/fr/statistiques/5435421

INSEE. (2022). *Nombre de voyages en France (SÉRIES CHRONOLOGIQUES Paru)*. Www.Insee.Fr. https://www.insee.fr/fr/statistiques/serie/010758175#Tableau

Jeannot, G. (2018). From e-government to the smart city: old and new issues. *Colloque European Group of Public Administration (EGPA)*.

Katadata Insight Center (KIC). (2020). *Beralih ke Pemasaran Digital, Siasat UMKM Bangkit dari Krisis*. Databoks. https://databoks.katadata.co.id/datapublish/2020/06/27/beralih-ke-pemasaran-digital-siasat-umkm-bangkit-dari-krisis

Keller, A., Groot, J., Matta, J., Bu, F., El Aarbaoui, T., Melchior, M., Fancourt, D., Zins, M., Goldberg, M., & Nybo Andersen, A.-M. (2022). Housing environment and mental health of Europeans during the COVID-19 pandemic: a cross-country comparison. *Scientific Reports*, *12*(1), 1–11. https://doi.org/10.1038/s41598-022-09316-4

Lallier, H. (2022). *Deux ans et demi de Covid-19 en France : l'histoire de l'épidémie en sept vagues*. L'Express. https://www.lexpress.fr/actualite/societe/sante/deux-ans-et-demi-de-covid-19-en-france-l-histoire-de-l-epidemie-en-sept-vagues_2176368.html

Laurent, P., & Rizhlaine, F. (2021). *Culture chez vous : les musées parisiens et leurs collections en visite virtuelle*. Sortiraparis.Com. https://www.sortiraparis.com/arts-culture/exposition/articles/211750-culture-chez-vous-les-musees-parisiens-et-leurs-collections-en-visite-virtuelle

Liputan6.com. (2020). *Jokowi Minta Masyarakat Berobat Online, Cek 5 Aplikasi Kesehatan Mitra Pemerintah*. Liputan6.Com. https://www.liputan6.com/health/read/4228757/jokowi-minta-masyarakat-berobat-online-cek-5-aplikasi-kesehatan-mitra-pemerintah

Martini, E. (2014). Penataan Kembali Taman Kota Berdasarkan Kriteria Kualitas Taman (Studi Kasus Taman Lapangan Banteng, Jakarta Pusat). *Forum Ilmiah*, *11*(3), 311–322.

MP France3. (2020). *Télétravail prolongé, attestation employeur, horaires décalés, une charte en négociation pour organiser le déconfinement*. France 3. https://france3-regions.francetvinfo.fr/paris-ile-de-france/teletravail-prolonge-attestation-employeur-horaires-decales-charte-negociation-organiser-deconfinement-1824154.html

Muminovic, M. (2016). Place identity and sustainable urban regeneration: Public space in Canberra City Centre. *Urban Regeneration & Sustainability*, *12*(4), 734–743. https://doi.org/https://doi.org/10.2495/SDP-V12-N4-734-743

Nam, T., & Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. *Proceedings of the 12th Annual International Digital Government Research Conference: Digital Government Innovation in Challenging Times*, 282–291.

Nouveal. (2020). *COVIDOM: Le suivi des patients porteurs et suspects COVID-19*. Nouveal. https://www.nouveal.com/references/covidom

Nursanto, A. (2011). Analisa Taman Menteng sebagai taman kota berdasarkan kriteria kualitas taman Jakarta Pusat. *Planesa*, *2*(1), 10–16.

OHCHR. (2020). *Romania's contribution to the oral update of the High Commissioner for Human Rights at the Human Rights Council's forty-fifth session Human rights implications of the COVID-19 pandemic*. United Nations Office of the High Commissioner for Human Rights. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.ohchr.org%2Fsites%2Fdefault%2Ffiles%2FDocuments%2FEvents%2FGoodPracticesCoronavirus%2Fromania-submission.docx&wdOrigin=BROWSELINK

Paauwe, M. (2021). *Assessing the Effect of Bike Lane Construction on Surrounding Property Values in Paris, France–A Quantitative Approach*. RIJKSUNIVERSITEIT GRONINGEN.

Pemerintah Provinsi DKI Jakarta. (2022a). *Instagram Account of Jakarta Provincial Government*. Instagram. https://www.instagram.com/dkijakarta/?hl=en

Pemerintah Provinsi DKI Jakarta. (2022b). *Tahukah kamu? Beberapa Ruang Publik di Jakarta Ada Wi-Fi Gratis!* Instagram. https://www.instagram.com/p/CgwFniGrzQS/?igshid=YmMyMTA2M2Y=

Prasetyo, F. (2017). Car Free Day: Transformasi Ruang dan Globalisasi Urbanisme Kontemporer di Bandung. *Jurnal Pemikiran Sosiologi*, *4*(1), 1–24.

Preda, I. (2020). Challenges in the management of emergency public procurement performed in Romania to combat the COVID-19 pandemic. *Business Excellence and Management*, *10*(SI 1), 67–87.

Rachmawati, R. (2019a). Toward better city management through smart city implementation. *Human Geographies*, *13*(2), 209–218. https://doi.org/10.5719/hgeo.2019.132.6

Rachmawati, R. (2019b). *Virtual Office Dan Coworking Space Sebagai Konsep Baru Pemanfaatan Ruang dan ICT: Kajian Di Perkotaan Yogyakarta, Laporan Hibah Penelitian Mandiri Dosen*.

Rachmawati, R., Mei, E. T. W., Nurani, I. W., Ghiffari, R. A., Rohmah, A. A., & Sejati, M. A. (2021a). Innovation in coping with the covid-19 pandemic: The best practices from five smart cities in Indonesia. *Sustainability (Switzerland)*, *13*(21), 1–30. https://doi.org/10.3390/su132112072

Rachmawati, R., Choirunnisa, U., Pambagyo, Z. A., Syarafina, Y. A., & Ghiffari, R. A. (2021b). Work from home and the use of ict during the covid-19 pandemic in indonesia and its impact on cities in the future. *Sustainability (Switzerland)*, *13*(12), 6760. https://doi.org/10.3390/su13126760

Rachmawati, R., Ettema, D., Rijanta, R., & Djunaedi, A. (2010). The Impact of ICT Use to The Change of Work Pattern and Its Relationship With work Travel. *Proceeding World Academy of Science, Engineering, and Technology*, *66*, 2587–2607.

Rachmawati, R., Hapsari, S. A., & Cita, A. M. (2018). Virtual space utilization in the Digital SMEs Kampongs: Implementation of Smart City and Region. *Human Geographies--Journal of Studies & Research in Human Geography*, *12*(1), 41–53. https://doi.org/10.5719/hgeo.2018.121.3

Rachmawati, R., Imami, Q., Nasution, L. A., Choirunnisa, U., Pinto, R. P. A., & Pradipa, H. (2020). Urban environmental management: an effort toward Magelang smart city. *IOP Conference Series: Earth and Environmental Science*, *451*(1), 12029.

Rachmawati, R., Rijanta, R., & Djunaedi, A. (2015). Location decentralization due to the use of information and communication technology: empirical evidence from Yogyakarta, Indonesia. *Human Geographies--Journal of Studies & Research in Human Geography*, *9*(1), 5–15. https://doi.org/10.5719/hgeo.2015.91.1

RATP Group. (2017). *Navigo monthly and weekly travel passes*. RATP Group. https://www.ratp.fr/en/titres-et-tarifs/navigo-monthly-and-weekly-travel-passes

Reuters. (2020). *Paris' Louvre Museum closed as staff walk out over coronavirus*. Thomson Reuters. https://www.reuters.com/article/us-china-health-france-louvre-idUSKBN20O1OG

Roederer, T., Mollo, B., Vincent, C., Nikolay, B., Llosa, A. E., Nesbitt, R., Vanhomwegen, J., Rose, T., Goyard, S., Anna, F., Torre, C., Fourrey, E., Simsons, E., Hennequin, W., Mills, C., & Luquero, F. J. (2021). Seroprevalence and risk factors of exposure to COVID-19 in homeless people in Paris, France: a cross-sectional study. *The Lancet Public Health*, *6*(4), e202–e209. https://doi.org/https://doi.org/10.1016/S2468-2667(21)00001-3

Rustanto, A. E. (2021). Pelayanan Terhadap Kepuasan Masyarakat pada RPTRA di Wilayah Jakarta Pada Masa Pandemi Covid-19. *Kolaborasi: Jurnal Administrasi Publik*, *7*(1), 84–100. https://doi.org/https://doi.org/10.26618/kjap.v7i1.4736

Rustanto, A. E., & Akhmad, J. (2021). RPTRA Activities Program in Services to the Community During the Covid-19 Pandemic. *1st Annual International Conference on Natural and Social Science Education (ICNSSE 2020)*, 97–102. https://doi.org/https://dx.doi.org/10.2991/assehr.k.210430.014

Sante Publique France. (2020). *Chiffres clés et évolution de la COVID-19 en France et dans le Monde*.

SEA Insight. (2020). *Pandemi Covid-19 Pacu UMKM Gunakan Media Digital*. Databoks. https://databoks.katadata.co.id/datapublish/2020/07/03/pandemi-covid-19-pacu-umkm-gunakan-media-digital

Sepe, M. (2021). Covid-19 pandemic and public spaces: improving quality and flexibility for healthier places. *Urban Design International*, *26*(2), 159–173. https://doi.org/https://doi.org/10.1057/s41289-021-00153-x

Setiani, S., Herlambang, S., & Tjung, L. J. (2020). Strategi Pengelolaan Coworking Space untuk Menghadapi Persaingan Bisnis (Objek Studi: Conclave Wijaya, Kelurahan Petogongan. Kecamatan Kebayoran Baru, Jakarta Selatan). *Jurnal Sains, Teknologi, Urban, Perancangan, Arsitektur (Stupa)*, *2*(2), 2851–2862. https://doi.org/10.24912/stupa.v2i2.8881

Setiawan, Y., Rushayati, S. B., Hermawan, R., Wijayanto, A. K., Prasetyo, L. B., & Permatasari, P. A. (2020). The effect of utilization patterns of green open space on the dynamics change of air quality due to the Covid-19 pandemic in Jabodetabek region. *Journal of Natural and Environmental Resources Management*, *10*(4), 559–567. https://doi.org/https://doi.org/10.29244/jpsl.10.4.559-567

Situmorang, A. P. (2020). *BI: Penjualan E-commerce Naik 26 Persen Selama Pandemi Virus Corona*. Merdeka.Com. https://www.merdeka.com/uang/bi-penjualan-e-commerce-naik-26-persen-selama-pandemi-virus-corona.html

SNCFConnect. (2022). *Comment voyager sans voiture pour réduire son empreinte carbone*. https://www.sncf-connect.com/article/comment-voyager-sans-voiture-pour-reduire-son-empreinte-carbone

Statista. (2020). *Leading city destinations in Europe in 2019, by number of international arrivals (in 1,000s)*. Statista Ltd. https://www.statista.com/statistics/487572/leading-european-city-destinations/

Statista. (2022). *Leading grocery delivery providers in France as of January 2022, by number of product references*. https://www.statista.com/statistics/1166588/grocery-delivery-by-products-listing-france/

Tebet Eco Park. (2022a). *Tebet Eco Park: Connecting People With Nature*. Dinas Pertamanan Dan Hutan Kota Provinsi DKI Jakarta. https://tebetecopark.id/

Tebet Eco Park. (2022b). *Tebet Eco Park: Connecting People with Nature*. Instagram. https://www.instagram.com/tebetecopark/?hl=en

TheJakartaPost. (2020). *Hotels in Paris to house the homeless*. PT Bina Media Tenggara. https://www.thejakartapost.com/travel/2020/03/20/hotels-in-paris-to-house-the-homeless.html

Tudor, A. D. (2021). Bucharest Public Transport: Challenges During The Covid-19 Pandemic. *Business Excellence and Management*, *11*(5), 103–112.

Túri, G., Kassay, J., Virág, A., Dózsa, C., Horváth, K., & Lorenzovici, L. (2022). Riding the Pandemic Waves—Lessons to Be Learned from the COVID-19 Crisis Management in Romania. *Tropical Medicine and Infectious Disease*, *7*(7), 122.

UN. ECE. (2015). *Paris Declaration :City in Motion, People First* (pp. 1–14). UN, PP - New York : PP - Geneva.

Vegacomp Consulting. (2021). *Mapping of Smart Cities, Smart Counties, and Smart Villages in Romania in 2021 - 860 Projects in 124 Cities*. Vegacomp Consulting SRL. https://vegacomp.ro/smart-city-scan-for-romania-snapshot-860-projects-in-124-cities/

Vie Publique. (2022). LOI no 2022-1089 du 30 juillet 2022 mettant fin aux régimes d'exception créés pour lutter contre l'épidémie liée à la covid-19. *Journal Officiel De La République Française*, 1–5.

Ville de Paris. (2022a). *Plan Climat Air Energie : 500 mesures pour la Ville de Paris. Ville de Paris*. Www.Paris.Fr. https://www.paris.fr/pages/nouveau-plan-climat-500-mesures-pour-la-ville-de-paris-5252

Ville de Paris. (2022b). *Service à Paris: Payer son stationnement*. Www.Paris.Fr. https://www.paris.fr/pages/payer-son-stationnement-2129#:~:text=0 974 594 800 (flowbird,à partir de février 2023

Ville de Paris. (2022c). *Service: Véhicules partagés*. Www.Paris.Fr. https://www.paris.fr/pages/vehicules-partages-4541

Wibowo, A., & Ritonga, M. (2018). Kebutuhan pengembangan standar nasional indonesia fasilitas taman kota. *Jurnal Standardisasi*, *18*(3), 161–170.

Yeung, P. (2021). *How France is testing free public transport*. https://www.bbc.com/worklife/article/20210519-how-france-is-testing-free-public-transport

Kurniawati, W., & Prihantini, P. (2019). Smart City and Shifting Meaning of Public Space. *IOP Conference Series: Earth and Environmental Science*, *248*, 012012. https://doi.org/10.1088/1755-1315/248/1/012012

Kuzior, A., Krawczyk, D., Brożek, P., Pakhnenko, O., Vasylieva, T., & Lyeonov, S. (2022). Resilience of Smart Cities to the Consequences of the COVID-19 Pandemic in the Context of Sustainable Development. *Sustainability*, *14*(19), 12645. https://doi.org/10.3390/su141912645

Megahed, N. A., & Abdel-Kader, R. F. (2022). Smart Cities after COVID-19: Building a conceptual framework through a multidisciplinary perspective. *Scientific African*, *17*, e01374. https://doi.org/10.1016/j.sciaf.2022.e01374

Shedid, M. Y. (2022). Exploring the different technological qualities of dynamic configurations in smart sustainable urban spaces. *IOP Conference Series: Earth and Environmental Science*, *1113*(1), 012029. https://doi.org/10.1088/1755-1315/1113/1/012029

Organisation for Economic Co-operation and Development (OECD). (2021). COVID-19 and a New Resilient Infrastructure Landscape. OECD Publishing.

Afrin, S., Chowdhury, F. J., & Rahman, M. M. (2021). COVID-19 pandemic: rethinking strategies for resilient urban design, perceptions, and planning. Frontiers in Sustainable Cities, 3, 668263.