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Comparison of COVID-19 contact-tracing apps in the context of public policy: the cases of Turkey and South Korea

Abstract

The healthcare systems of almost every country have been facing an unprecedented crisis since the beginning of the COVID-19 pandemic in March 2020. In response, numerous countries have designed and launched their unique applications to inform their citizens about COVID-19 and to follow their health situation. While South Korea has been showing an effective fight against COVID-19, Turkey is one of the most affected ones by the virus. This paper aims to identify key differences and similarities between the contact tracing apps that are used by Turkey and South Korea during COVID-19. In this way, it addresses how two members of the Organization for Economic Co-operation and Development (OECD), one developing (Turkey) and other developed (South Korea) countries, integrated their public policies and crisis management responses with the mobile phone applications and at what scale they are successful. Also, this paper investigates how these differences/similarities between their applications have affected their paths in the pandemic. Comparing their applications, it discusses policy-making processes, technological differences, and contact tracing strategies with policy recommendations for other countries.

Keywords: COVID-19, contact tracing apps, Turkey, South Korea, public policy

JEL Classification Codes: I18, L38, O57

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Porównanie aplikacji do śledzenia zakażeń wirusem COVID-19 w kontekście polityki publicznej. Przypadki Turcji i Korei Południowej

Streszczenie

Od wybuchu pandemii COVID-19 w marcu 2020 r. w prawie każdym kraju świata systemy opieki zdrowotnej są zagrożone bezprecedensowym kryzysem. W odpowiedzi na tę sytuację w wielu krajach zaprojektowano i uruchomiono własne unikalne aplikacje, aby informować swoich obywateli o COVID-19 i śledzić ich sytuację zdrowotną. Podczas gdy Korea Południowa skutecznie walczy z COVID-19, Turcja jest jednym z krajów najbardziej dotkniętych koronawirusem. Niniejszy artykuł ma na celu zidentyfikowanie kluczowych różnic i podobieństw między aplikacjami do śledzenia kontaktów używanymi w Turcji i Korei Południowej podczas epidemii COVID-19. Omówiono to, w jaki sposób dwa kraje członkowskie Organizacji Współpracy Gospodarczej i Rozwoju (OECD) – kraj rozwijający się (Turcja) i kraj rozwinięty (Korea Południowa) – integrowały swoją politykę publiczną, reagowały w sytuacji kryzysowej, wprowadzając aplikacje na telefony komórkowe, i jak duży był sukces, który odniosły w tej dziedzinie. W niniejszym artykule zbadano również, w jaki sposób różnice i podobieństwa między aplikacjami wykorzystywanymi w analizowanych krajach wpłynęły na ich funkcjonowanie w pandemii. W związku z tym zostały omówione procesy kształtowania polityki, różnice technologiczne, strategie wobec śledzenia kontaktów oraz rekomendacje polityczne dla innych krajów.

Słowa kluczowe: COVID-19, aplikacje do śledzenia kontaktów, Turcja, Korea Południowa, polityka publiczna

Kody klasyfikacji JEL: I18, L38, O57

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), also known as the coronavirus disease (COVID-19) was first detected in China in 2019 and became the biggest threat to public health soon enough (Shahroz et al., 2021). The pandemic changed human mobility at the global level just like in South Korea and Turkey. According to the Worldometer (2021) data, by September 9, 2021, the number of COVID-19 cases in the world was 224,009,794 and the death toll was 4,620,069. The numbers for Turkey were a total of 6,590,414 cases and 59,170 deaths; for South Korea 267,470 cases and 2,343 deaths. Given these numbers, governments are trying to decrease the damage of the pandemic by taking various precautions like mandatory mask use in public places, vaccine campaigns, intense contact tracing, and testing, economic aid programs to those who have lost their income, etc. While the usage of face masks is one of the most effective tools to reduce the transmission of the virus among the masses (Rahimi & Talebi Bezmin Abadi, 2020), not everyone

uses face masks properly and it is impossible to monitor everyone to check whether they obey the rules or not. In this regard, when a person is affected by the virus, it is critical to find other people who have interacted with the infected person. In this sense, various contact tracing techniques are used by the authorities, whereas technology plays a crucial role because old-fashioned methods like manual contact tracing are hard to apply, take time, and do not give the desired results. Therefore, epidemiologists and technologists are working together to support classical techniques with digital contact tracing (Anglemyer, 2020). The usage of mobile phone apps has been one of the ways of digital contact tracing during COVID-19 and it has been applied widely by the governments to control the pandemic. These apps track people's locations via Bluetooth, Wi-Fi, or GPS (Global Positioning System) technologies. South Korea and Turkey are two of the many countries that are using technology and contact tracing apps to slow the spread of the virus. Among private apps introduced by companies, their governments have launched various mobile health apps available in Google Play Store and Apple Store. In this article, Turkey's Hayat Eve Sığar; (Life Fits Into Home) and South Korea's 자가격리자 안전보호 (Self-Quarantine Safety Protection – Jaga keoklija anjeonboho-) contact tracing applications designed and implemented by their governments during the COVID-19 pandemic will be compared.

Literature review

Although many studies have been done so far on mobile health applications and contact tracing applications, the COVID-19 literature on mobile phone apps is new and limited. The two countries' experiences with mobile phone apps are based on different dates. The mobile phone location tracking apps Korea launched for COVID-19 are based on already structured surveillance technology which started in 2015 as the Middle East Respiratory Syndrome coronavirus (MERS-CoV) occurred (Kim et al., 2021). On the other hand, even though Turkey's history of contact tracing apps is not as old as in Korea, the usage of mobile health applications is quite excessive. In fact, in the list of most popular medical apps in Turkey in Google Play Store, among the top ten the Ministry of Health has 3 apps (SimilarWeb, 2021).

In contact tracing apps, two main approaches have been used. A centralized approach in contact tracing apps means that a centralized server collects all the data from app users and saves it in one place, sharing anonymous data only with users at high risk. On the other hand, an app that emphasizes a decentralized approach collects data in users' phones so the server's role is only to transmit the data. Moreover, the app erases the data every 14 or 21 days but shares an infected person's anonymous

data with each user once the user permits sharing (Ng et al., 2021). Regarding data protection and privacy, many European authorities defend the use of a decentralized approach instead of a centralized one. In this way, the data of individuals cannot be used for other purposes by states or third parties, and privacy can be guaranteed (Thomas et al., 2021).

Privacy, security, surveillance, and transparency concerns come first as the reasons for not downloading the contact tracing apps so solving these concerns is coming first when launching the apps, since the high usage rates of the applications are essential for their effectiveness. Likewise, voluntary usage of the apps and public perception have a critical role, too (Hogan et al., 2021). For example, Qatar's app is mandatory to use and requires access to photos, while the UAE can fine their citizens for avoiding the usage of their app (Shahroz et al., 2021). Countries like Austria, Finland, Denmark, Norway, Estonia, and the UK give importance to their apps' transparency via their open-source design and codes, others like Algeria, Kuwait, and Tunisia took criticism from Amnesty International because of their lack of transparency in their contact tracing apps. In 2020, Iran's app, AC19, was removed from Google Play Store because of its spying actions (Sato, 2020). On the other side, about twenty percent of Finland's population downloaded their app within the first 24 hours, and 37 percent of the Irish population also downloaded their app in the first two months when it had launched. The reasons for the high numbers were the common usage of smartphones and the emphasis on individual privacy (McDonnell, 2020).

When it comes to methods that are used in the apps, countries may share common features. For instance, the People's Republic of China uses Alipay and Wechat to inform its citizens about their location risk assessment. These apps use codes with the colors green, yellow, and red, where the risk goes up from green to red, which is what most public places require (Radanliev et al., 2020). Turkey uses a similar coloring method in its app's risk map, as will be discussed further. Additionally, some governments prefer to cooperate with private companies. For instance, Google and Apple developed Exposure Notification API (Google, 2020), which is a privacy-preserving contact tracing to support public health agencies that have been used by more than 30 countries (Rahman, 2021).

Materials and methods

In the process of collecting the existing data, the literature has been reviewed from Google Scholar with the keywords of "contact tracing apps," "Turkey," "South Korea," "public policy," and "COVID-19" from 2020 to October 2021. Released documents

and mobile health applications by the governments of Turkey and South Korea have been analyzed for the comparison of both countries' contact tracing applications.

Results

South Korea

Korea's support system for epidemiological investigation leans on the Act on Prevention and Management of Infectious Diseases and uses the data hub technology to gather and analyze the information. It is a cooperation between the Ministry of Land, Infrastructure, and Transport, Korea Centers for Disease Control and Prevention, and the Ministry of Science and ICT, and it has been operating since March 26, 2020 (Ministry of the Interior and Safety, 2020). The COVID-19 Epidemiological Investigation Support System (EISS) of Korea is one of the important features to fight back the pandemic, since it accelerates the contact tracing teams' job (Ministry of Economy and Finance, 2020). The EISS works together with the smart city hub to collect data, which is a product of the Ministry of Land, Infrastructure, and Transport (Joo & Shin, 2020).

The Republic of Korea published two reports in October 2020 and in May 2020 to give publicity to their pandemic battle. According to these reports, on February 12, 2020, the Self-Check Mobile App, on March 7, the Self-Quarantine Safety Protection App, and on April 27 Self-Quarantine Safety Band became available. On March 19, the special entry procedures applied with the help of these apps at the entrance to the country were expanded to all countries' citizens. On May 11, 2020, the obligation to take a COVID-19 test at the entrance to the country began to be applied to all passengers (Government of the Republic of Korea, 2020). Thus, after checking their health status with the Self-Check app, passengers have to take a COVID-19 diagnostic test so that they can download another app called Self-Quarantine Safety Protection App (Lee, 2021). The use of the Self-Quarantine Safety Protection App is not mandatory for those living in Korea, but anyone entering the country must download the app (as of April 1, 2020). According to the government data, as of April 13, 91.4% of those in self-quarantine had downloaded the application (Ministry of Economy and Finance, 2020). However, people with 'A' visas and 'Quarantine Exemption Certificate' are exempted from the 14-day quarantine. After they show a negative COVID-19 test to the authorities, they should use the Self-Check App to check their health status and answer daily calls from officers for 14 days during their travel. In the beginning, the Self-Check app requires data from people like their passport number, nationality,

phone number, address, any symptoms related to the disease. This data is also shared with the public health clinics, which are part of the local governments. If the application is not downloaded or used regularly by the traveler, a warning message will be sent for the first two days. If there is no change in the person's behavior on the 3rd day, the person is reached by phone and told to use the application. If the situation continues on the 4th day, the police force will step in to track the person. Also, when the 14-day period expires, the user is notified to delete the application (Ministry of Economy and Finance, 2020).

On the other hand, all Koreans and other travelers with long-term visas must download the Self-Quarantine Safety Protection App for their mandatory 14-day quarantine. The Self-Quarantine Safety Protection App has two main features that are self-check and location-tracking via GPS data. The government officer can track a person's location or reach their personal information in case of a symptom checked by the user or an absence of self-check (Government of the Republic of Korea, 2020). Individuals under self-quarantine must check four symptoms (fever, cough, sore throat, dyspnea) of themselves twice a day via the app. This data and whether the person is obeying quarantine is shared with the responsible government officer, too (Ministry of Economy and Finance, 2020). Koreans who refuse to use the app and/or violate the quarantine rules are fined up to 10 m won or sentenced to 1 year in prison. For foreigners, this penalty is immediate deportation. The same penalty applies to those who leave the route between the testing center and the designated quarantine place. If the self-quarantined person's location shows a different place from his or her quarantine place or the GPS connection is lost, this person's contact tracer officer is immediately informed. Moreover, if the app senses about 3 hours of inactivity, it will send an alert notification that you must respond to assuming the device has been left somewhere (Lee, 2021). Additionally, the app's guideline states that people who do not obey the quarantine rules will have to wear a Safety Band. In possible ongoing disobedience, the Korean government can put them in one of their quarantine facilities for the remaining time. Those who do not download the app purposely or have no phones at all must stay in the Korean government quarantine centers (Government of the Republic of Korea, 2020).

Turkey

Preparations for possible pandemics have been going on in Turkey since 2004, and the first pandemic preparation plan was prepared for all provinces in 2006 (Şimşek et al., 2020). Thus, when Turkey experienced the influenza A (H1N1) pandemic, it did not catch off guard.

During COVID-19, in the filiation practices carried out in 81 provinces, the teams record their work with mobile devices in the field *(*FİTAS*, 2020)*. The mobile phone app called the Filiation and Insulation Tracking (Filyasyon ve İzolasyon Takibi) was designed by the Ministry of Health, teams of The Contact Tracing and Isolation Tracking System (Filyasyon ve İzolasyon Takip Sistemi -FITAS-) can track both positive cases and the people they encounter *(*Filyasyon ve İzolasyon Takibi*, 2020)*. The collected data with the FITAS is shared with the Public Health Management System *(*Halk Sağlığı Yönetim Sistemi -HSYS-) and the Family Medicine Information System *(*Aile Hekimliği Bilgi Sistemi -AHBS-). For 14 days, the assigned family doctor for the case follows the health situation of the contacted person, and in case of any shown-up symptoms, the doctor refers the patient to hospital (Şimşek et al., 2020).

As of September 26, 2021, the Ministry of Health of the Republic of Turkey has 42 mobile health applications in Google Play Store. Among these, the application called Korona Önlem (Corona Prevention) is being used to inform and guide citizens about COVID-19 (Korona Önlem, 2020). With this application, citizens can verify their identity information, answer the questions asked step by step, learn about the possibility of being infected with the coronavirus disease, and receive guidance accordingly. Another application, HealthPass, is an app where citizens can keep their vaccination, test, and immunity certificates under international standards, which can be used easily during travel. The app is to make the Digital Green Certificate procedure published by the European Union on March 17, 2021 operational, to show the certificate containing health information during the passes between the Member States of the European Union and to exempt people from measures such as PCR testing and quarantine, only if they comply with the rules (HealthPass, 2021).

The Republic of Turkey Directorate of Communications has released an announcement with a headline of the Pandemic Isolation Tracking Project developed against COVID-19 on April 8, 2020. The project is about monitoring patients when they are in isolation and was developed with the cooperation of the Ministry of Health, Information and Communication Technologies Authority, and all GSM operators. The announcement mentions that people who are in the house quarantine will receive a text message and will be reached out if they leave their home (Directorate of Communications, 2020). If they refuse to return to their home, the law enforcement authority will be informed, and necessary administrative penalties including administrative fines and criminal investigation will apply (Kocaeli İl Sağlık Müdürlüğü, 2020; TC Bornova Kaymakamlığı, 2021; TC Antalya Valiliği, 2021).

In this sense, Life Fits Into Home is launched to monitor infected people and alert app users when they are in a place where the possibility of contracting the virus is high or if they are getting in close contact with an infected individual. If an infected

person leaves their isolated place, they receive warnings via text messages and calls. If the person does not obey the warnings, their identity, location, and contact information are shared with the Ministry of Internal Affairs and law enforcement authority. To use the app, individuals must enter their phone numbers. However, a limited version of the app is available for those who do not want to enter their personal information into the app. Moreover, if they consent, users can share their data like location and risk status with other users. A feature inside the app allows users to scan barcodes of public places like malls to get information about that place such as the number of daily visitors, etc. Besides all these, one of the most important features of the application is the information about HES codes because public places like state offices and malls require HES codes to let you in. Also, interprovincial travel with an airline, by bus or train does not allow people to board without a HES code (Hayat Eve Sığar, 2020b). The HES Code is a code that allows you to share securely whether you carry any risk in terms of the COVID-19 disease with institutions and individuals in your transactions such as transportation or visit within the scope of the Controlled Social Life. The HES codes you share can be queried through the application or the services provided to the institutions.

With the safe area implementation inside the app, people can create QR codes for the areas they are responsible for and hang QR Code printouts at the entry points of the relevant areas. Also, users can report airports, private businesses, (isolated) individuals, social activities, and public transportations anonymously with the justification of breaching COVID-19 measures. While doing that, there is an option to add proofs like photos (Hayat Eve Sığar, 2020a). It is possible to search hospitals, pharmacies, and metro stations inside the app's map. Besides, people who will enter Turkey can obtain the entry form from Life Fits Into Home. Users can check their COVID-19 vaccine information as well as generate vaccine cards, too (Hayat Eve Sığar, 2020b; Hayat Eve Sığar, 2021). At the same time, the app provides a quick and short health check test. After that you verify your phone number, answer the questions asked step by step, and receive guidance according to how you should act by being evaluated according to the complaints you have given in terms of the coronavirus disease. It is possible to repeat the test every hour unless the user wants to choose one of the options of "find the nearest health facility" or "call the Ministry of Health Communication Center (SABİM)." Lastly, users can see risk zones from the risk map, too. On this map, high-risk areas are shown with red, while low-risk areas are shown with blue. Middle ranges change with the order of green, yellow, and orange. The app has been presented as a core value for the transition to the Controlled Social Life by the government (Hayat Eve Sığar, 2020b).

Discussion

While digital solutions are crucial for accelerating data collection, the success rate of these applications is directly proportional to the usage rate, and usage of the apps may change from country to country depending on individuals' trust in the government, privacy concerns, level of technological sophistication of countries, or low smartphone ownership. For example, as of July 2020, the adoption of the government-endorsed COVID-19 contact tracing app in Turkey was 17.3 (Statista, 2021), while the total usage rate of Korea's Self-Quarantine Safety Protection and Self-Diagnosis apps amounted to 34.4 percent in 2020 (Statista, 2021b). Also, the number of smartphone users in Korea was 39.2 million, while in Turkey this number was 55.14 million as of May 2021 (Statista, 2021a). As can be seen, the gap in the smartphone usage rate between the two countries is less than the contact tracing apps' adoption rate. It may have multiple reasons like different rates of trust in governments or the technological sophistication of smartphone owners in both countries, and it can be researched in future studies.

Another point is that sometimes malfunctions of the apps may disrupt the user experience. For instance, in a Korean blog post, an app user mentioned their experience with their assigned officer for self-quarantine. The user had to present proof to the officer that they were in their quarantine place but not in another location (Hogan et al., 2021). These types of errors occur even in the biggest companies' applications, and they can be tolerated to some point. The fact that the assigned officer can see the user's live location and warn them immediately is a show of high surveillance and maybe bigger discomfort than the malfunction.

Korea sends a location-based text alert to every mobile phone user who gets physically close with an infected person (Boudreaux et al., 2020) and assigned officers are always available to people in quarantine in case of a possible question or for the delivery of care packages, and most of the blog users found this kind of service provided by officers helpful (Kim et al., 2021).There are also people who are comfortable with state monitoring because they feel being cared for. A similar thing can be seen in Google Play Store comments on Life Fits Into Home. For example, there are a lot of users that are satisfied with the app's easy access to services like vaccine cards and HES codes. Besides, the app's rating in Google Play Store is 4.2/5, which is an optimistic number (Hayat Eve Sığar, 2020b).

Some factors prevent applications which perform health checks according to the data entered by the users from being effective (Hogan et al., 2021). For example, the app belonging to Korea does not allow users to enter detailed symptoms or cannot

detect asymptomatic infected individuals (Kim et al., 2021). The same problem occurs in Turkey's app, too. In Life Fits Into Home, when users click "Calculate Corona Risk" they see four buttons which are "I'm good," "I'm good but feeling a bit infirm," "I don't feel good," and "I feel infirm and sick." If a user selects the "I'm good" option, the app does not ask further questions (Hayat Eve Sığar, 2020b). The fact that the statement of "I'm good" is a vague one makes it hard to detect infected people. While the inability to identify asymptomatic individuals can be considered a general problem, a detailed questionnaire can be added. This can be done incrementally, assuming users do not want to spend too much time on the app. Another issue is that the accuracy of the data depends on the users themselves. However, apps cannot understand whether the data is entered with honesty or detect that the users can understand and separate the symptoms correctly (Hogan et al., 2021). In this sense, although the apps cannot eliminate this problem, bringing a periodically mandatory COVID-19 test rule to everyone may increase the chance to detect asymptomatic patients.

At the beginning of the pandemic, the share of personal information was seen as necessary because people were afraid of this new virus so privacy concerns were at the second line. The roots of this attitude go back to 2015 when Middle East Respiratory Syndrome (MERS) emerged. Since then, transparency has been a highly featured issue in Korea for the sake of public health. Nevertheless, as the public alarm settled down in time, privacy concerns emerged quickly. In September 2020, to dissolve public concerns away, the Contagious Disease Prevention and Control Act went through some changes, and unnecessary information like sex, age, and surname is not shared by authorities anymore (Ahn & Wickramasinghe, 2021).

In Korea, personal information that individuals in self-quarantine enter the application, including health and location data, is recorded in the application and the government has access to it. However, it is unknown how long this data will be retained by the authorities with access or when it will be destroyed (Lee, 2021). On March 9, 2020, the National Human Rights Commission of Korea showed its concerns about data privacy, included the words "excessive disclosure of private information of COVID-19 patients' privacy protection" in their press release's headline (NHRCK, 2020). This concern included sharing infected persons' travel destinations with exact times with the public by local and central governments. Following this release, on March 14, the KDCA sent a guideline to local governments on this issue. With the updated version of the guideline in June 2020, the limitation of the share of information of infected people started to be applied and anonymity gained importance (Park, Choi, & Ko, 2021). However, these concerns are not completely resolved since South Korea uses centralized apps.

On the other hand, the privacy policy of Life Fits Into Home is prepared based on Law No. 6698 on the Protection of Personal Data (KVKK), Article 10. It declares that the processed personal data of users is limited with the time frame of the pandemic. The personal data of the app users are being processed for the protection of public health, preventive medicine, performing medical diagnosis, treatment, and care services, and the planning and management of healthcare services. Moreover, it states that the users can use their rights which are stipulated in the KVKK, Article 11 by applying to the Ministry, following KVKK Article 13 and related provisions of the Notification on the Procedures and Principles (Hayat Eve Sığar, 2020c). In this sense ID and telephone numbers, location, profession, and health information are being collected via the app. While the Turkish government guarantees the security and privacy of personal data, there are some exceptions for the usage of the data under the third paragraph of Article 6 of Law No. 6698 titled Conditions for Processing of Special Data. In this sense, to protect public health, operate preventive medicine, medical diagnosis, treatment, and nursing services, the Ministry of Health, Social Security Institution, and healthcare facilities can use personal information without explicit consent (Directorate of Communications, 2020). However, like Korea, Turkey uses a centralized approach, too, and it is unknown how long the collected data will be stored. Also, it can be understood that to protect public health privacy of users can be ignored.

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In states of crisis like this, governments have been in a desire for ending uninvited occurrences together with taking chance of expanding their legitimacy, while citizens want to protect their health and privacy (Ahn & Wickramasinghe, 2021). In this sense, the order of importance between public health and privacy varies between policymakers and citizens/interest groups. The important thing here is to somehow achieve the balance in between. Otherwise, policy effectiveness may decline. For example, there is a possibility that the usage of voluntary mobile applications will decrease or remain below a certain level when privacy is not given sufficient importance. The importance that the state gives to privacy is also important for ensuring citizen trust. In this way, citizens may show willingness to participating in state policies. However, it is unknown that the use of these surveillance technologies will not be used for political suppression in the future because implementations introduced during crisis times have a low chance to be terminated once the crisis is over (Barriga et al., 2020). For example, Turkey's special communication tax (ÖİV) was introduced a temporary one under the name of "earthquake tax" but it was never

repealed (T24, 2012) or when Korea changed its laws during the MERS outbreak to collect personal data during crisis times (Kim et al., 2021), which are still in force.

Since 16 percent of the Korean population and 9 percent of the Turkish population is over 65 years old (World Bank, 2019), age-related diseases can be encountered more in Korea. So, healthcare facilities can be used for introducing apps to people with health problems, and advertisements of mobile health apps can be put in ones that people already are using (Park, Han, Kim, & Rho, 2021). In this way, the usage rate of the apps for higher effectiveness can be reached. Another factor that is affecting the usage rate is the voluntary basis of downloading the apps. While some countries require the use of their apps mandatory, other countries prefer not to. Both Turkey and South Korea's apps are in the mandatory category, and it can be seen as a minus.

The fact is that this pandemic is not just a health crisis but also an economic, social, political one for most of the countries. To overcome this new problem sudden precautions introduced by the authorities created backfires for some people or groups. For example, while Korea's method of using GPS data, CCTV footage, and credit card transactions with the help of the apps during contact tracing allow epidemiologists to trace more people than classical methods, it took criticism. In this sense, Turkey does not follow this kind of procedure like using CCTV footage or credit card transactions but Life Fits Into Home's excessive range for access to GPS and network-based location information, phone book, taking and saving photos on the camera, wireless connections, full network access, reading Google service configuration, Bluetooth settings, and retrieving data from the Internet is already concerning, since it collects a lot of data in its centralized hub. In addition to these, access to the already registered e-government identity information, "e-pulse" system, and "MERNIS" (population and citizenship affairs) data are provided. Since Life Fits Into Home works with three GSM operators, all data shared with the operator with which the mobile phone is registered gives direct access to government systems through this application (BBC News Türkçe, 2020).

Lastly, Turkey's Life Fits Into Home is using a centralized approach and does not claim data destruction. The app saves users' IDs in readable characteristics without protection. It means that once a user's phone is connected, personal information can be reached by other users that are in a close area, which may end up tracking another user (Thuraisingham et al., 2015). Korea's app is no different from Turkey's. Centralized apps like South Korea's and Turkey's that use GPS to track location collect excessive data and are vulnerable to hacking (Kaya, 2020).

Author Contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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