

Kamlean, Artima; Mitomo, Hitoshi; Otsuka, Tokio

## Conference Paper

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# Lack of Trust and its Influence on the Installation of the COVID-19 Contact-Confirming Application in Japan

KAMPLEAN Artima, MITOMO Hitoshi, & OTSUKA Tokio

Keywords: Contact confirming application, COVID-19, Japan, Pandemic, Privacy, Trust in Government, Trust in media

## 1. Introduction

This study aims to investigate the influence of different types of trust on the installation of the COVID-19 Contact-Confirming Application (COCOA) in Japan with data collected from both installed and non-installed users. Despite the country's digital readiness, Japanese people hesitate to install the application for notifying contact with an infected person and it has not been widely adopted in Japan. Previous literature agrees that trust and privacy concern has been a primary issue for installing the application. The present study adopts the extended valence framework assuming that trust directly influences the user's perception of both negative and positive utility of the contact-confirming application which results in the installation.

Novel Coronavirus (Covid-19) was first reported in December 2019 and World Health Organization (WHO) announce the disease as a pandemic in March 2020 (WHO, 2020). Later WHO recommended using a digital tool for controlling infectious diseases as the pandemic surges worldwide. Japan also launch a Contact Confirming Application (or COCOA) developed by the Ministry of Health, Labour and Welfare of Japan in June 2020. Despite high expectations, the application was not widely adopted.

This leads to our motivation of what could be a cause of this hesitation in installing COCOA in Japan. After a literature review, we found that number of literature and reports from WHO agree that trust in government and privacy concerns play the key factor in adoption. The literature also mentioned the digital divide as one obstacle in adopting the tracing application. However, it does not seem to be an issue in Japan since the country has a high penetration rate of smartphones and ICT readiness. Because most research focuses on an intention to adopt phase, there is still a lack of empirical evidence from users in the literature regarding a contact tracing application. This study can contribute to the gap in the literature with the data from actual users in Japan. To reach the goal of the study we ask the following research questions.

**RQ1** What *trust* influences the Japanese's perceived risk and perceived benefit of COCOA?

**RQ2** Does trust in COCOA's *install* and *non-install* group work differently? If so, how?

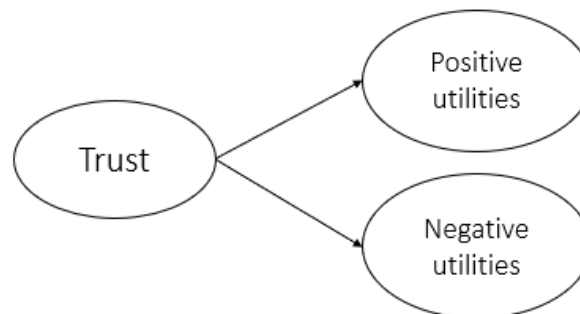
We expected that trust in government will positively influence perceived benefit in the install group while the non-install group shows the opposite result. As media serve a function to

communicate to the public, we expected trust in media to influence perceived benefit in the install group. Lastly, trust in technology is expected to influence the perceived benefit for both groups as COCOA is an application working on a smartphone.

## 2. Literature review

### 2.1 Perceived risk and perceived benefit

We assume that the relationship between trust, perceived benefit, and perceived risk are the keys to explaining users' hesitation. To illustrate this, we use the valence framework proposed by Peter and Tarpey (1975). The framework explains the consumer's decision-making process based on balancing positive utilities (benefit) and negative utilities (risk) influenced by the consumer's trust. later in 2009, Kim et. Al. proposed the extended version emphasizing the influence of trust and incorporating action into an outcome. This model is suitable for the study because the process is similar to how the user considers COCOA's installation. In our analysis, positive utilities are referred to as a benefit of the application while negative utilities are referred to as privacy and security concerns. Based on the literature we developed the analytical framework in figure 1



**Figure 1:** Analytical framework by the author based on Peter and Tarpey (1975) and Kim et. Al., (2009).

It is noteworthy that literature related to the topic when the data was collected was limited especially studies using survey data as most studies focused on users' intention to download the app. Our unique data set enabled us to investigate the reason behind the installation from both installed and non-install groups.

### 2.2 Trust

Most findings from previous literature point out two key factors to the installation: trust, especially in the government, and user privacy concerns. Regarding trust, this aligns with WHO interim guidance stating that building trust is a crucial contribution to the digital tool's success (World Health Organization, 2020c). Trust has long been identified as a crucial function to sustain

society (Misztal, 1996 and Luhmann, 1988 in Buskens) although, at the institutional level, trust and reliance do not refer to the same thing (Townley and Garfield, 2013). When we trust, we also open an opportunity to be rewarded (positive outcome) or betrayal (negative outcome) which also features in the concept of the valence framework.

A cross-country online survey by Altmann et al. (2020) supports this point showing that user with a lack of trust in the government has a lower intention to install. Some participants also expressed concern about whether the government can monitor them through the application. They conclude that cyber security, privacy, and lack of trust in government are the main barriers to adoption. Another study added that technical issues also play an important role in user decisions, such as having a device to install the app or how the application works (Jacob and Lawarée, 2020). However, studies from Asia show the more complex result of trust. The study from Singapore argues that high trust in government could cause people to underestimate the risk instead and resulting in non-corporative action. On the other hand, another study from Hong Kong illustrated that the country handled the crisis while the political situation and public trust is shallow. They point out that community capacity is responsible for this success during that time.

### **2.3 Japan's contact confirming application – COCOA**

Japan launches a local contact confirming application called COCOA developed by the Ministry of Health, Labour and Welfare (MHLW) in June 2020. The application is voluntarily installed and operates on iOS and Android smartphones with Japanese and English translations. It is developed based on application programming interfaces (APIs) offered by Apple and Google. To prioritize the privacy of users, COCOA uses a short-range communication function (Bluetooth technology) to notify possible contact with a tested positive person if the person is within the range of 1 meter for 15 minutes or more. In such a way the contact record and location will not be exposed outside the device. Despite an attempt to protect users' privacy and the fact that Japan has a high smartphone penetration rate and ICT readiness, COCOA was not widely adopted.

## **3. Method and data**

### **3.1 Methodology**

To answer research questions, factor analysis is employed to identify the trust that influences the installation. Then use structural equation modeling (SEM) to analyze the relationship between trust and perceived utility with path analysis. For factor analysis, the survey measures the concept of trust in the following aspect (1) trust in public institutions including central government and COVID-19 related agencies, (2) Trust in mass media, (3) Trust in online media, (4) Trust in technology and society, (5) Perceived benefit of COCOA, and (6) Perceived risk including privacy issues. All items were suggested in the previous literature of Lockey et al., (2021), Cairney & Wellstead (2021), Altmann et al (2020), Mcknight, Thatcher & Clay (2011) with original items to reflect the Japanese context. In addition, gender, education, age, and perceived seriousness of COVID-19 are added to the control variables.

### 3.2 Survey data

The online survey was conducted in March 2021 by Macromill Inc., a professional survey company. Participants were recruited from Tokyo metropolitan areas – the highest infectious number during the time the survey was conducted. A total of 1036 participants were equally divided into the COCOA installed group and non-install group (N = 518 from each) with an age distribution of 6 groups. Majority of respondent's lives in Tokyo (41%) followed by Kanagawa (26.3%), Saitama (17%) and Chiba (15.7%). Gender distribution has slightly more males (52.7%) than females (47.3%). The majority of respondent uses smartphones with Android user at 50% followed by iPhone user at 49.6% while 0.4% uses feature phone and others.

## 4. Results

### 4.1 Factor analysis

Factor analysis was analyzed using IBM SPSS statistic 27 and IBM SPSS AMOS statistic graphic 27 software. Since the data does not show a normal distribution, exploratory factor analysis (EFA) is conducted with Maximum Likelihood extraction and Promax rotation. After removing items with Communalities below 0.4 the result shows total variance cumulative explained at 73.766% with no factor correlation above 0.7. Cronbach's alpha reliability test ( $\alpha$ ) results are above 0.7 in all extracted factors which are considered acceptable in social science. Both installed and non-install groups have the same number of factors loading with the same components. The result of Kaiser-Meyer-Olkin (KMO) and Bartlett's test for homogeneity of variances shows that the data is suitable to conduct the factor analysis. The results are shown in Table 1

**Table 1:** Factor loading for EFA

Components	Factor loading	Cronbach's Alpha
<b>Factor 1: Trust in a public institute</b>		
Japanese government	.892	0.888
Ministry of Health, Labour and Welfare	.973	
Your local government	.729	
COVID-19 related agencies (PCR center, health center, etc.,)	.573	
<b>Factor 2: Trust in mass media</b>		
Expert (Medical association, expert who gives interview in television etc.,)	.619	0.876
Television	.824	
Newspaper	.957	
Radio	.831	
Magazine	.539	
<b>Factor 3: Trust in online media</b>		
Internet news website	.558	0.875
Social media (Facebook, Twitter, etc.,)	.854	

Video website (Youtube, Nico Nico Douga, etc..)	.915	
Portal website (Yahoo blog etc..)	.787	
<b>Factor 4: Expected benefit of COCOA</b>		
Let others in contact know if you are tested positive	.657	0.821
With proper awareness, people around me will also install COCOA	.794	
With proper awareness, people around me will also register positive	.901	
<b>Factor 5: Perceived risk of COCOA</b>		
I'm worried that my infection will be known to a third party	.690	0.824
If my infection is known, it will hinder my work and school.	.863	
If my infection is known, it will cause trouble for the people around me.	.801	
<b>Factor 6: Trust in technology</b>		
Do you think you can trust the COCOA system	.783	0.801
Do you think you can rest assured when you go out by installing COCOA	.745	
Do you think COCOA is useful for society as a whole	.715	

In Confirmatory Factor Analysis (CFA), trust in local government was removed considering that this observed variable does not have a role in promoting the use of the COCOA application. According to the literature on trust in government in Japan, a local government is distinguished from the central government. The model fit criteria are satisfied after adjusting according to the modification indices suggested in AMOS. Since the data were collected through a survey, Harman's single factor test is conducted to check the Common Method Bias (CMB) and found no issue. The model satisfied the fit criteria (CMIN = 745.777, DF = 164, P = 0, CFI = 0.949, SRMR = 0.0508, RMSEA = 0.059) then we proceed to SEM.

#### 4.2 Structural Equation Modeling (SEM)

For SEM we use 2,000 samples of Bootstrap with 95% confidence intervals to deal with non-parametric calculations. Trust was set as an independent variable while dependent variables are perceived benefit and perceived risk. The data set were divided into two models representing both groups of users. The SEM results are shown in Table 2 below

**Table 2:** SEM result

<b>Trust in dealing with COVID-19</b>	Model 1 - Installed users		Model 2 - Non-install users	
	Perceived benefit	Perceived risk	Perceived benefit	Perceived risk
Trust in public institute	NS	NS	NS	.182*
Mass media	NS	.237*	NS	NS
Online media	NS	NS	NS	NS
Trust in technology (COCOA)	.207***	NS	.364***	-.174*
<b>Control variables</b>				
Education	NS	NS	.074*	-.117*

Perceived seriousness of COVID-19	NS	NS	NS	NS
Gender	NS	NS	.178*	NS
Age group	NS	-.082***	NS	NS

\*\*\* < 0.001, \*\* < 0.01, \* < 0.05

In addition, we found a statistically significant trust with control variables in the installed group as follows: perceived seriousness of COVID-19 with trust in mass media (.118\*\*), education with trust in online media (-.101\*\*), and trust in mass media (-.065\*). For the non-install group, the age group shows a negative relationship with trust in technology for COCOA (-.028\*) while positive with trust in online media (.032\*) and mass media (.029\*).

## 5. Discussion and implications

This study aims to investigate the influence of different types of trust in the installation of the COVID-19 Contact-Confirming Application (COCOA) in Japan. The use of COCOA is not successful in Japan despite the country's readiness in utilizing a contact tracing application on a smartphone. We hypothesize that hesitancy is rooted in the issue of trust in Japan. This study uses an original online survey and answers the following research questions

**RQ1** What trust influences the Japanese's perceived risk and perceived benefit of COCOA?

Factor analysis has confirmed 6 influencing factors regarding the COVID-19 pandemic although the component shows a different pattern from expectation. Trust in experts, for instance, the doctor or health specialist is loaded with trust in mass media instead of trust in the public institute. The possible explanation is that expert often gives an interview through mass media channel such as television. Another interesting point is the factor loading of trust in technology and society. It reveals that only observed variables of trust in technology pass the criteria in EFA and trust in society is dismissed.

**RQ2** Does trust in COCOA's install and non-install group work differently? If so, how?

Surprisingly, trust in government does not have a strong statistically significant perceived benefit in the installed group but has a slightly significant perceived risk for the non-install group instead. Trust in mass media slightly increases perceived risk in the installed group. This can be explained by the incident of an Android user's malfunction covered by the media before the survey was conducted (Nikkei, 2021). Trust in online media does not show statistically significant in both groups. It reflects the situation in Japan where mass media still hold a strong influence even in this digital era that online can serve as an alternative information source.

In general, trust in the institutional (public institute, mass media, and online media) does not have a strong influence on perceived risk and perceived benefit in COCOA users. Instead, more personal-oriented trust like trust in technology has the strongest influence on perceived benefit in both groups. The result reveals that the reason behind the Japanese's hesitancy to install the contact

confirming application (COCOA) does not solely cause by a lack of trust in government and privacy concerns as previous literature suggested. Although users still have concerns about privacy risks, they are more considering the benefits of installing COCOA, therefore, the user feels hesitant to install the application. The development of COCOA put effort to protect users' privacy but unfortunately overlook the features that users place important the most.

In a closer look at the Japanese context, a digital divide is not an issue in the current study since 99.6% of participants are smartphone users. Control variables reveal a possible influence of user profiling and the fact that the app is voluntarily installed. Another research on the adoption of COCOA finds that the generation gap should be taken into consideration because each considers it intensive to install COCOA from a different aspect (Shoji et al., 2021). This explains the strongly significant age group in the control variable for the installed group. The same article also suggested more social-related factors should be considered if the app is voluntary install. Literature on trust in Japan suggested the country was successful in responding to COVID-19 despite having low trust in the government. It suggests a tendency of paying over-attribute to one factor "trust" which is a highly cultural context (Wright, 2021). One possible explanation is the Japanese lack of trust, especially in government, but they still rely on the public institute dealing with COVID-19. It is consistent with other literature stating that trust and reliance are different (Townley and Garfield, 2013).

To promote COCOA's download, it is advised to emphasize more on the benefit of the application. COCOA itself should gain enough trust from users which is where mass media can help communicate to the public. However, it should be done carefully when reporting the downside of the application, especially in the high-saturated country where media is high influence like Japan since this can affect perceived risk among users. Even so, we believe the media have the potential to help create a public understanding of COCOA. In that regard, media can help create trust in the application which can increase the perceived benefit, the feature that the user considers the most.

## **6. Limitation**

This research has some limitations as follows. First, the current study excluded "distrust" which is not to be confused with lack of trust. Recent literature shows evidence that distrust can co-exist with trust and should be studied separately (Lewicki, McAllister, & Bies, 1998). This study only investigates the influence of trust and therefore cannot assume that distrust causes hesitancy in installing COCOA. second, the data set was only collected from current installed and non-install users at the time of the survey. It does not consider the actual usage or the possibility of opt-out users in the survey. Lastly, since the data were collected through an online survey, participants are biased with familiar with technology tools.



## References

- Altmann, S., Milsom, L., Zillessen, H., Blasone, R., Gerdon, F., Bach, R., et al. (2020). Acceptability of app-based contact tracing for COVID-19: Cross-country survey study. *JMIR mHealth and uHealth*, 8(8), e19857.
- Jacob, S., & Lawarée, J. (2021). The adoption of contact tracing applications of COVID-19 by european governments. *Policy Design and Practice*, 4(1), 44-58.
- Kawakami, N., Sasaki, N., Kuroda, R., Tsuno, K., & Imamura, K. (2021). The effects of downloading a government-issued COVID-19 contact tracing app on psychological distress during the pandemic among employed adults: Prospective study. *JMIR Mental Health*, 8(1), e23699.
- Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support Systems*, 44(2), 544-564.
- Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *Academy of Management Review*, 23(3), 438-458.
- Lockey, S., Edwards, M. R., Hornsey, M. J., Gillespie, N., Akhlaghpour, S., & Colville, S. (2021). Profiling adopters (and non-adopters) of a contact tracing mobile application: Insights from australia. *International Journal of Medical Informatics*, 149, 104414.
- Luhmann, N. (2018). *Trust and power* John Wiley & Sons.
- Mäkelä, P., & Townley, C. (2013). *Trust: Analytic and applied perspectives* Rodopi.
- O'Neill, O. (2002). *A question of trust: The BBC reith lectures 2002* Cambridge University Press.
- Peter, J. P., & Tarpey Sr, L. X. (1975). A comparative analysis of three consumer decision strategies. *Journal of Consumer Research*, 2(1), 29-37.
- Riemer, K., Ciriello, R., Peter, S., & Schlagwein, D. (2020). Digital contact-tracing adoption in the COVID-19 pandemic: IT governance for collective action at the societal level. *European Journal of Information Systems*, 29(6), 731-745.
- Shoji, M., Ito, A., Cato, S., Iida, T., Ishida, K., Katsumata, H., et al. (2021). Prosociality and the uptake of COVID-19 contact tracing apps: Survey analysis of intergenerational differences in japan. *JMIR mHealth and uHealth*, 9(8), e29923.
- World Health Organization. (2020). *Contact tracing in the context of COVID-19: Interim guidance, 10 may 2020*
- World Health Organization. (2021). *COVID-19 strategic preparedness and response plan: Operational planning guideline: 1 february 2021 to 31 january 2022* World Health Organization.
- Wright, J. (2021). Overcoming political distrust: The role of 'self-restraint' in japan's public health response to COVID-19. Paper presented at the *Japan Forum*, , 33. (4) pp. 453-475.