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Discussing Potential Factors Influencing Public Attitudes Toward the Acceptance of Government-Deployed Technologies for Public Policy Implementation and Enhancement*

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I. Introduction

Shih et al. (2024) investigated factors influencing public attitudes toward digital contact tracing (DCT) technologies in Taiwan, particularly during the COVID-19 pandemic. Using a quantitative approach, the researchers surveyed 450 individuals to explore their acceptance of four specific DCTs: Geofencing, Big Data Analysis, the 1922

Invited Article

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Short Message Service System, and the Taiwan Social Distancing App. By conducting a thorough search of literature databases such as Web of Science, they reviewed DCT and health-surveillance-related literature to summarize six potential factors that may affect the public's attitude toward DCT acceptance. These six factors are perceived usefulness, privacy concerns, fear of technology, political trust, pro-social inclination, and compliance. Additionally, Shih et al. (2024) delved into understanding how and why the influences of these factors vary across different types of DCTs. As stated by the authors, their study contributes to examining a comprehensive set of factors, supporting the simultaneous deployment of several DCTs to enhance policy compliance, and exploring the relative complexity of the phenomenon.

Specifically, the empirical results of the study suggest that perceived usefulness, privacy concerns, political trust, pro-social inclination, and compliance are all statistically significant in the general model of DCT acceptance, with fear of technology as the only exception. However, only perceived usefulness and trust consistently show positive effects across all DCT categories, while the other factors appear to have varied impacts depending on whether the DCT technologies are coercive or voluntary. Therefore, this study offers valuable insights for the implementation and deployment of future DCTs by highlighting the importance of policy design and the influence of cultural context.

From the perspective of public attitudes toward the acceptance of DCT technologies in Taiwan, the empirical findings of this study also offer insights into the public's adoption of governmental socio-technical innovations in broader public policy implementations. The factors discussed, along with the distinction between coercive and voluntary DCT technologies, help conceptualize and enrich the e-governance literature related to public acceptance of government e-services.

In the following sections, by reflecting on Shih et al.'s (2024) work, this reflection paper first discusses some of the commonly adopted theoretical frameworks related to individual acceptance of innovations and technologies, including technology acceptance models and the Theory of Planned Behavior. Some relevant literature is also reviewed to reflect Shih et al.'s (2024) discussion on public privacy concerns and trust in government agencies' deployment of e-services for public policy implementation. This is followed by a section devoted to final reflections. It is expected that the literature and thoughts discussed in this reflection paper not only correspond with the findings in Shih et al.'s (2024) study, but also suggest additional directions for future research.

II. The Perspective of Technology Acceptance Models

In Shih et al.'s (2024) research, the authors indicated that perceived usefulness is the factor having the most consistent and prominent effect among those discussed. Undoubtedly, perceived usefulness has been one of the most commonly utilized factors in predicting an individual's adoption of technologies. The factor originates from Davis's (1989) Technology Acceptance Model (TAM), which was later extended by Venkatesh et al.'s (2003) study into the Unified Theory of Acceptance and Use of Technology (UTAUT), and along many other technology-acceptance-related frameworks.

Specifically, public acceptance of government agencies' innovative e-services has become an important interdisciplinary research topic, attracting researchers from various fields. Popular technology acceptance models such as TAM and UTAUT have been integrated with other theories and applied to explore this phenomenon (Susanto & Goodwin, 2013; Zuiderwijk et al., 2015; Yang & Wu, 2022b). Therefore, in addition to perceived usefulness, other factors, such as perceived effort, social influence, and facilitating conditions from technology acceptance models, have also been adopted and adapted to understand how the general public responds to the use of innovative technologies deployed by government agencies for public policy implementation. In particular, in Shih et al.'s (2024) study, the more voluntary DCT technologies, such as the 1922 Short Message Service System (SMS) and the Taiwan Social Distancing App (TSDA), tend to rely on the public's autonomy and willingness to adopt and use them.

Within technology acceptance models, perceived usefulness is typically defined as the degree to which an individual believes that using a particular system or technology will enhance their performance (Davis, 1989; Venkatesh et al., 2003). In contrast, in Shih et al.'s (2024) study, the perceived usefulness of using DCT technologies such as SMS and TSDA is not linked to work performance. Instead, the factor measures the degree of public benefit perceived by the individual in terms of epidemic prevention effectiveness, as DCT technologies are tools used by government agencies to strengthen public policy implementation. Although DCT technologies were used during COVID-19 to constrain public behavior in favor of the collective good, the concept of perceived usefulness viewed through the lens of technology acceptance models can also offer a useful perspective for understanding public acceptance of DCT technologies such as SMS and TSDA, as discussed in Shih et al.'s (2024) work.

Similarly, it can be argued that other technology-acceptance-model factors, including

perceived effort, social influence, and facilitating conditions, may be considered in future extensions of Shih et al.'s (2024) study. According to the literature (Davis, 1989; Venkatesh et al., 2003), perceived effort is defined as the degree of ease an individual associates with using a system or technology. Social influence refers to the extent to which a person believes that important others think he or she should use a system or technology. Lastly, facilitating conditions measure the degree to which an individual believes that related resources and support are available to enable use of the system or technology. Among these three factors, perceived effort has often been applied to determine public acceptance of e-government services. It could affect the use of DCT technologies, such as SMS and TSDA, especially when individuals are concerned about the potential challenges involved in learning to use unfamiliar technologies. In addition, social influence was closely tied to compliance with government measures during the COVID-19 pandemic, as indicated in Shih et al.'s (2024) study. They point out in the literature review that social norms and social pressure can increase the public's intention to use contact tracing apps (Trang et al., 2020; Williams et al., 2021). Likewise, from a technology acceptance perspective, the influence of important others, including friends, colleagues, and family members, may shape an individual's decision to accept DCT technologies. Lastly, while some DCT technologies may be unfamiliar to the general public, the availability of supportive infrastructure and resources may also facilitate their acceptance.

Furthermore, a longitudinal study could provide additional insights. According to Venkatesh et al.'s (2003) UTAUT model, the effects of technology acceptance factors may vary over time. For example, perceived effort may be significant during the early adoption phase but decreases in influence with continued use. Similarly, social influence from important others may play a critical role in the initial stages of adoption but becomes less relevant as users become more familiar with the system. Therefore, if appropriate empirical data can be collected, a longitudinal study of DCT technology adoption may offer different insights. It would also provide a fresh perspective on how technology acceptance models apply to public acceptance of DCT technologies.

III. The Perspective of Theory of Planned Behavior

In addition to the technology acceptance models, Ajzen's (1991) Theory of Planned Behavior (TPB) is another commonly employed framework for exploring the general public's intention to adopt e-government services (Hung et al., 2006; Hung et al., 2013; Rana et al., 2015). According to Ajzen (1991), an individual's intention to engage in a

specific action or behavior is influenced by three key antecedent constructs: attitude toward the behavior, subjective norm, and perceived behavioral control. Attitude refers to the extent to which performing the behavior is seen as favorable or unfavorable, and it is shaped by various behavioral beliefs. A behavioral belief is an individual's subjective judgment about the likelihood that the behavior will lead to a particular outcome. Subjective norm reflects the perceived social pressure to perform or not perform the behavior. It is influenced by normative beliefs, which are the perceived expectations of significant individuals or social groups. Perceived behavioral control captures the individual's perception of how easy or difficult it is to carry out the behavior. This is determined by control beliefs, defined as the perceived presence of internal or external factors that may either facilitate or hinder the behavior's execution (Ajzen, 1991).

For example, by employing TPB as the base theoretical framework for their study, Hung et al. (2006; 2013) examined the factors that determine the general public's acceptance of government e-services in Taiwan. The services explored include the online tax filing and payment system and mobile government services. In their proposed frameworks, the authors stated that perceived usefulness, perceived effort, perceived risk, trust, compatibility, and interactivity can act as behavioral beliefs that influence an individual's attitude towards the acceptance of government e-services. External influence and interpersonal influence were identified as normative beliefs that shape subjective norm. Lastly, self-efficacy and facilitating conditions were considered control beliefs that affect an individual's perceived behavioral control.

When connected to Shih et al.'s (2024) study, it is expected that the aforementioned factors based on the theoretical framework of TPB can also provide valuable insights and offer potential avenues for extending future research on the public's acceptance of government DCT technologies. Similarly, the key constructs of TPB can offer an additional lens through which to discuss the influence of factors such as perceived usefulness, privacy concerns, fear of technology, trust, pro-social inclination, and risk perception as examined in Shih et al.'s (2024) work.

IV. Data-Related Privacy Concerns

Government agencies have engaged in analyzing the datasets obtained from the public domain to enhance their policy implementation through data-driven governance. For instance, Chang (2023) stated that Taiwanese government agencies have learned to conduct data analysis by using the data collected from their respective social media websites to

formulate appropriate strategies for improving public affairs governance. However, unsurprisingly, privacy concerns remain a long-standing issue affecting public acceptance of government agencies' use of socio-technical information technologies and systems. As Shih et al. (2024) indicated in their literature review, privacy concerns have served as a barrier to the public's acceptance of contact tracing applications. The public may fear the government's use of data, especially when there is uncertainty about how privacy is protected in the data generated by DCT technologies (Altmann et al., 2020; Zhang et al., 2020). For example, in the case of surveillance data collected by government agencies, a key dilemma lies in how to balance the use of such data with the protection of individual privacy.

Similarly, this issue has long existed in the field of open government data. In particular, the use of governmental open data has been considered as an important approach to spurring the development of innovative applications that enhance the public good. For instance, a recent study in Taiwan found that during the COVID-19 pandemic, volunteer software developers collaborated with government agencies by utilizing open government data to create web and mobile applications that helped both government officials and the public track medical supplies, such as face masks (Yuan et al., 2020). However, public concerns over privacy have also influenced how government agencies, acting as data providers, release datasets, requiring them to de-identify and carefully remove personal information before making data publicly available (Huang et al., 2020; Benmohamed et al., 2024). Nevertheless, these privacy concerns may lead government agencies to limit the release of high-value datasets. As a result, the datasets that are released may have low granularity, which can reduce the public's perceived usefulness and willingness to use them (Yang & Wu, 2022b). Accordingly, public concerns about privacy have long shaped perceptions of how government agencies use publicly collected datasets and may also affect how these agencies deploy innovative socio-technical systems or technologies for public policy implementation. This phenomenon is evident not only in the government's deployment of DCT technologies, as indicated by Shih et al. (2024), but also more broadly in the overall context of public policy implementation.

V. Trust

Trust is another important factor identified in Shih et al.'s (2024) study regarding the public's acceptance of government DCT technologies. In their literature review, it was noted that the public's willingness to adopt e-government services can be influenced by the

public's trust in government (Lee, 2011). It can be argued that the public's trust in government services is rooted in their trust in the agencies that administer those services and deploy related systems or technologies for policy implementation. Similarly, in the context of public engagement with governmental open data, it was suggested that the public would need to develop trust in government agencies concerning the sustainability and quality of the agencies' open data services. For example, when professional data users intend to fully engage with governmental open data, they need to demonstrate effectively that the agencies providing such services will maintain the services consistently and that the data quality will meet their expectations (Yang & Wu, 2022a; 2022b). Other researchers also emphasize that public trust is critical for individuals to accept government e-services, such as the online tax filing and payment system and mobile government services (Hung et al., 2006; Hung et al., 2013). Accordingly, Shih et al.'s (2024) study confirms that public trust remains a key factor influencing public attitudes toward the acceptance of various systems or technologies deployed by government agencies.

VI. Final Reflections

Shih et al.'s (2024) study contributes to understanding the factors that influence public attitudes toward DCT technologies in Taiwan. The study examined a comprehensive set of factors in the context of the simultaneous deployment of several DCT technologies. Among these, the use of Geofencing was considered the most coercive, Big Data Analysis was deemed coercive, the 1922 Short Message Service System was viewed as voluntary, and the Taiwan Social Distancing App was seen as the most voluntary. The study determined that perceived usefulness, privacy concerns, trust, pro-social inclination, and compliance are important factors associated with the public's acceptance of DCTs, with the majority of variance explained by these factors.

In particular, perceived usefulness and trust are the most consistent explanatory variables. Accordingly, the authors argued that their findings highlight that public acceptance of DCTs is not solely related to perceived usefulness, as frequently emphasized in the technology acceptance literature. Trust also plays a consistent and significant role in public adoption, especially in the case of more voluntary DCT policy instruments. Additionally, Shih et al.'s (2024) findings further suggested that privacy concerns are negatively associated with Geofencing, Big Data Analysis, and the 1922 Short Message Service System, but not with the Taiwan Social Distancing App. While the Taiwan Social Distancing App places greater emphasis on privacy protection through decentralized data

storage and user anonymity, this finding provided evidence that public concerns regarding privacy and data security can be mitigated through innovative design solutions, as well as through persuasive and well-developed policy and regulatory frameworks that effectively address these issues.

However, according to Shih et al. (2024), fear of technology is defined as an irrational fear or anxiety arising from the use of advanced technology or equipment. In their empirical analysis, fear of technology is found to be statistically insignificant, which is inconsistent with their theoretical expectations. This inconsistency may be attributable to certain limitations of the study. As noted by Shih et al. (2024), their survey respondents tended to skew toward younger residents in northern regions and individuals with higher educational backgrounds. These respondents may have been more likely to participate in online surveys conducted during the COVID-19 pandemic. Conversely, younger and more highly educated individuals may also be more inclined to accept and use DCT technologies and may exhibit lower levels of fear toward advanced technology. This sampling characteristic may therefore provide a plausible explanation of why fear of technology was not found to be significant in their study.

Additionally, while DCT technologies can range from coercive to voluntary in nature, the aforementioned theoretical frameworks such as the Technology Acceptance Model and the Theory of Planned Behavior are primarily oriented toward voluntary contexts and thus possess inherent limitations. As Shih et al.'s (2024) study indicated, certain DCT technologies can be coercive and mandated by authorities during periods of a public health emergency. Under such circumstances, these models may have limited explanatory power in accounting for non-voluntary adoption. Instead, institutional factors, such as government mandates and regulatory frameworks, may serve as more salient antecedents influencing public attitudes toward the acceptance of government-deployed DCT technologies in policy implementation. This assumption also suggests the possibility to reconsider the core constructs of the current research model, particularly with respect to how the framework may be restructured and operationalized under conditions of non-voluntary use. The conceptual meanings and measurements of key factors may also require careful reassessment. Moreover, the focus of inquiry may shift from examining whether citizens accept DCT technologies to understanding how the legitimacy of administrative authority is exercised to secure public compliance and sustain policy implementation.

Specifically, Shih et al.'s (2024) study also highlighted the importance of cultural context. Their findings suggested that Taiwanese society tends to exhibit collectivist orientations and a relatively higher level of acceptance toward coercive DCT technologies.

Nevertheless, beyond cultural influence, individual-level factors may also be shaped by broader institutional contexts, including mandates, regulatory arrangements, and policy adjustments introduced to address the COVID-19 pandemic. In particular, the broader institutional context of Taiwan's pandemic governance may have influenced public acceptance of DCT technologies. For example, Taiwan underwent a policy transition from a zero-COVID strategy to a coexistence strategy, which may have altered public perceptions of health risks and, consequently, public attitudes toward the adoption of DCT technologies. Similarly, during such policy transitions, levels of public trust in government may fluctuate in response to perceived governance performance, thereby affecting public attitudes toward government-deployed DCT technologies. Additional institutional factors, such as the digital divide and variations in administrative capacity, may also warrant consideration in order to further deepen and enrich the analytical framework of the study.

Lastly, while Shih et al.'s (2024) study provided valuable insights by emphasizing the importance of policy design and the influence of cultural and institutional contexts, it is also worth noting that government agencies' implementation of public policy will continue to involve the deployment of various emerging systems or technologies that often generate or collect data containing personal information. For example, generative AI based on large language models has recently become a significant breakthrough in information technology and has attracted interest from government agencies seeking to explore its potential applications in public policy implementation. It is foreseeable that more innovative IT applications will be deployed by government agencies in the public sector, and this trend is expected to persist with the advancement of new technologies. Nevertheless, as Shih et al. (2024) suggested, public acceptance of technology varies across different contexts and cultures, with individuals placing varying emphasis on the influencing factors identified in their study. Similarly, the discussion presented in this reflection paper may offer additional insights and point to potential directions for future research, especially as governments continue to adapt and learn to implement public policies using newer information technologies. Finally, a longitudinal research design could provide an alternative approach to further examine whether public acceptance of government-deployed technologies, as well as the influence of key factors, changes over time across different cultural and institutional contexts. Such an approach would offer insights into the dynamics of public attitudes at different stages of technological and policy development.

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References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Altmann, S., Milsom, L., Zillessen, H., Blasone, R., Gerdon, F., Bach, R., Kreuter, F., Nosenzo, D., Toussaert, S., & Abeler, J. (2020). Acceptability of app-based contact tracing for COVID-19: Cross-country survey study. *JMIR mHealth and uHealth*, *8*(8), e19857. https://doi.org/10.2196/19857

Benmohamed, N., Shen, J., & Vlahu-Gjorgievska, E. (2024). Public value creation through the use of open government data in Australian public sector: A quantitative study from employees' perspective. *Government Information Quarterly*, *41*(2), 101930. https://doi.org/10.1016/j.giq.2024.101930

Chang, C.-H. (2023). A study on the positioning of data analytics in government web 2.0 governance. *Taiwanese Journal of Public Administration*, (65), 41-76. https://doi.org/10.30409/JPA.202309_(65).0002

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319-340. https://doi.org/10.2307/249008

Huang, H., Liao, C. Z.-P., Liao, H.-C., & Chen, D.-Y. (2020). Resisting by workarounds: Unraveling the barriers of implementing open government data policy. *Government Information Quarterly*, *37*(4), 101495. https://doi.org/10.1016/j.giq.2020.101495

Hung, S.-Y., Chang, C.-M., & Kuo, S.-R. (2013). User acceptance of mobile e-government services: An empirical study. *Government Information Quarterly*, *30*(1), 33-44. https://doi.org/10.1016/j.giq.2012.07.008

Hung, S.-Y., Chang, C.-M., & Yu, T.-J. (2006). Determinants of user acceptance of the e-

government services: The case of online tax filing and payment system. *Government Information Quarterly*, *23*(1), 97-122. https://doi.org/10.1016/j.giq.2005.11.005

Lee, C.-P. (2011). Positioning "Trust" in e-governance: An exploratory literature review. *Taiwanese Journal of Public Administration*, (39), 105-147.

Rana, N., Dwivedi, Y., & Lal, B. (2015). *Factors influencing citizen's adoption of an e-government system: Validation of the decomposed theory of planned behavior* [Conference presentation]. UK Academy for Information Systems Conference 2015, March 17-18, Oxford, United Kindom. https://aisel.aisnet.org/ukais2015/14

Shih, C.-H., Wu, Y.-C., Liu, H. K., & Wu, S.-W. (2024). Factors determining public attitudes towards digital contact tracing technologies in Taiwan. *Taiwanese Journal of Public Administration*, (67), 1-37. https://doi.org/10.30409/JPA.202409_(67).0001

Susanto, T. D., & Goodwin, R. (2013). User acceptance of SMS-based e-government services: Differences between adopters and non-adopters. *Government Information Quarterly*, *30*(4), 486-497. https://doi.org/10.1016/j.giq.2013.05.010

Trang, S., Trenz, M., Weiger, W. H., Tarafdar, M., & Cheung, C. M. K. (2020). One app to trace them all? Examining app specifications for mass acceptance of contact-tracing apps. *European Journal of Information Systems*, *29*(4), 415-428. https://doi.org/10.1080/0960085X.2020.1784046

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478. https://doi.org/10.2307/30036540

Williams, S. N., Armitage, C. J., Tampe, T., & Dienes, K. (2021). Public attitudes towards COVID-19 contact tracing apps: A UK-based focus group study. *Health Expectations*, *24*(2), 377-385. https://doi.org/10.1111/hex.13179

Yang, T.-M., & Wu, Y.-J. (2022a). *The survey of the factors influencing the use of open government data in Taiwan: The preliminary findings* [Conference presentation]. 23rd Annual International Conference on Digital Government Research (dg.o), June 15-17, Virtual Event, Republic of Korea. https://doi.org/10.1145/3543434.3543643

Yang, T.-M., & Wu, Y.-J. (2022b). To use or not to use? Exploring the factors influencing professional reusers' intention to adopt and utilize governmental open data in Taiwan. *Journal of Educational Media & Library Sciences*, *59*(2), 101-135.

https://doi.org/10.6120/JoEMLS.202207_59(2).0001.RS.BE

Yuan, E. J., Hsu, C.-A., Lee, W.-C., Chen, T.-J., Chou, L.-F., & Hwang, S.-J. (2020). Where to buy face masks? Survey of applications using Taiwan's open data in the time of coronavirus disease 2019. *Journal of the Chinese Medical Association*, *83*(6), 557-560. https://doi.org/10.1097/JCMA.0000000000000325

Zhang, B., Kreps, S., McMurry, N., & McCain, R. M. (2020). Americans' perceptions of privacy and surveillance in the COVID-19 pandemic. *Plos one*, *15*(12), e0242652. https://doi.org/10.1371/journal.pone.0242652

Zuiderwijk, A., Janssen, M., & Dwivedi, Y. K. (2015). Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology. *Government Information Quarterly*, *32*(4), 429-440. https://doi.org/10.1016/j.giq.2015.09.005