

A Review of Empirical Research on Citizen Participation in Government Crowdsourcing Platforms: Lessons for Government Leaders and Managers

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Abstract

As a form of online co-production, government crowdsourcing platforms have received growing attention from scholars and practitioners as a means of enhancing government-citizen co-production. This research aims (1) to introduce government leaders and managers to recent empirical research examining real-world cases of government crowdsourcing from different countries, (2) to systematically organize, analyze, and discuss the findings and implications of recent government crowdsourcing empirical studies, and (3) to provide government practitioners with evidence-based insights that could encourage informed decisions about how they design, implement, and evaluate government crowdsourcing platforms effectively and inclusively. Literature review is limited primarily to empirical works that rigorously examined real-world cases of government crowdsourcing. By focusing on a review of empirical research on crowdsourcing co-design and crowdsourcing design/government delivery platforms, this study discusses the key findings systematically and offers some insights and implications for leaders and managers seeking effective and inclusive design and implementation of government crowdsourcing platforms.

Keywords : government crowdsourcing, citizen participation, co-production, cases, literature review

시민의 정부 크라우드소싱 플랫폼 참여에 관한 실증연구 검토: 정부 지도자와 관리자를 위한 교훈

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요약

온라인 공동 생산의 한 형태인 정부 크라우드소싱 플랫폼은 정부와 시민의 공동 생산을 활성화하기 위한 수단으로 학계와 실무자들로부터 점점 더 많은 관심을 받고 있다. 이 연구의 목적은 효과적이고 혁신적인 온라인 공동 생산 서비스를 원하는 정부 지도자와 관리자에게 다양한 국가에서 실행된 실제 사례를 경험적으로 연구한 논문들을 소개하고 체계적으로 이 논문들의 발견과 의미를 정리, 논의하여 효과적이고 포용적인 정부 크라우드소싱 플랫폼을 설계, 구현, 관리, 평가하는데 도움을 주고자 한다. 이 연구는 실제 정부 크라우드소싱 사례를 조사한 일부 실증 연구에 대한 문헌을 검토한다. 특히 이 논문은 크라우드소싱 공동디자인과 크라우드소싱디자인/정부집행 형태의 플랫폼에 관한 경험적 연구에 관한 검토를 통해 주요 발견사항을 논의하고 이를 바탕으로 효과적이고 포용적인 크라우드 소싱 플랫폼을 디자인하고 관리하고자 하는 정부의 리더와 관리자에게 통찰력과 함의를 제공하고자 한다.

주제어 : 정부 크라우드소싱, 시민참여, 공동생산, 사례, 문헌연구 검토

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I . Introduction

In recent decades, along with the advancement of digital technologies, digital government has been widely used as a major channel for providing public services and promoting citizen participation. In particular, digital government has facilitated various forms of online citizen participation and co-production. As a form of online co-production, government crowdsourcing platforms have received growing attention from scholars and practitioners as a means of enhancing government-citizen co-production (Chatfield & Reddick, 2018; Cho, et al., 2016; Cordella & Paletti, 2018; Kim, et al., 2020; Noh, et al., 2019; Noveck, 2015). Recently, the rapid and widespread diffusion of smartphones has enabled the government to offer crowdsourcing platforms via mobile applications as a complementary means of online co-production.

Despite the lack of agreement on the definition of crowdsourcing, there are at least a couple of common characteristics that link it to the field of public administration. First, government crowdsourcing is characterized as a type of citizen participation in general (Liu, 2017a) and as a specific type of co-production in particular (Moon, 2018). Citizens play a key role, and their participation is an essential element of the success of government crowdsourcing platforms. Second, crowdsourcing is a type of information technology (IT) application in that IT serves as a crucial instrument. Government crowdsourcing often occurs via online platforms where citizens and governments co-produce public services.

Government crowdsourcing platforms are mainly offered through websites and/or mobile applications.

It should be noted that in terms of the scope of the literature review on crowdsourcing research, this study focuses on empirical research that examines real-world cases of government crowdsourcing and has been published in academic journals requiring blind review processes. Thus, studies on non-government crowdsourcing platforms run by private organizations such as *OpenStreetMap* (Gardner, et al., 2020), social media platforms (Loukis, et al., 2017), or non-profit organizations such as *FixMyStreet* (Pak, et al., 2017; Sjoberg, et al., 2017) are not included in the review. Furthermore, empirical research focused on government crowdsourcing platforms in general (without real-world cases) (e.g., Thapa, et al., 2015) or empirical studies published as a form of government report (without rigorous blind review processes) (Ponti & Craglia, 2020) are excluded from this literature review. It is expected that this study's focused review of research that looks into real-world cases will allow government leaders and managers to gain more relevant and evidence-based insights (Meijer & Potjer, 2018).

There are multiple ways of defining and measuring citizen participation in government crowdsourcing. For clarification, this research uses the term participation broadly by taking it from the literature reviewed. Thus, the type of citizen participation varies depending on the reviewed literature. Some studies measure citizen participation in terms of citizens' willingness or decision to participate

(Wijnhoven, et al., 2015) in a government crowdsourcing platform, or whether or not they use it (Clark, et al., 2013; O'Brien, et al., 2016; Xu & Tang, 2020), for example, by casting a vote (Berg, et al., 2020). Other research measures citizen participation as the degree of participation in terms of the sharing of ideas (e.g., the number of posts), feedback (e.g., comments/responses), evaluation (e.g., likes/dislikes) (Schmidhuber, et al., 2017), frequency of use (Schmidhuber, et al., 2019; Wu, 2020), and continued participation (Schmidhuber, et al., Forthcoming). Other researchers measure citizen participation as a choice of participation channel (Müller, et al., 2021).

The purpose of this literature review is threefold. First, it aims to introduce government leaders

and managers to recent empirical research on real-world crowdsourcing cases in different countries. Second, it aims to organize, analyze, and discuss the findings and implications of recent government crowdsourcing empirical studies in a systematic manner. Lastly, it aims to provide government practitioners with evidence-based insights that encourage informed decisions on designing, implementing, and evaluating government crowdsourcing platforms effectively and inclusively.

II. Analytical Framework

Scholars (Brabham, 2013; Liu, 2021; Moon, 2018; Nam, 2012) have discussed various typologies or frameworks in order to understand

〈Table 1〉 Typology of Government Crowdsourcing

		Citizens	
		Design	Delivery
Government	Design	Type I: Crowdsourcing co-design Web-based platform for e-consultation Cases: Oasis of the SMG in Korea (URL: oasis.seoul.go.kr)	Type III: Government design/crowdsourcing delivery Public-service apps developed by individuals or groups of citizens using public data and APIs provided by governments. Cases: CodeNamu in Korea (URL: www.codenamu.org)
	Delivery	Type II: Crowdsourcing design/government delivery Web-participation of citizens (e-reporting, e-suggestion), online complaint system Cases: Korea's e-People administered by the Anti-Corruption and Civil Rights Commission in Korea (URL: www.epeople.go.kr)	Type IV: Crowdsourcing co-delivery Joint production of public service by citizens and governments in the web and mobile communication environment. Public-service apps developed by both governments and citizens through collaboration. Cases: The Mobile Seoul Platform of the SMG (URL: mplatform.seoul.go.kr), The National Assembly Toktok (URL: toktok.io)

source: Moon (2018, p. 300)

government crowdsourcing systematically. This research applied Moon's typology of government crowdsourcing (Moon, 2018) as an analytical framework for a literature review. Moon suggested four types of government crowdsourcing typology using co-production literature: crowdsourcing co-design, crowdsourcing design/government delivery, government design/crowdsourcing delivery, and crowdsourcing co-delivery. As shown in Table 1, Moon(2018) highlights the roles of citizens and government in designing and implementing public services and policies.

Among the four types of crowdsourcing, this research focuses on Type I (crowdsourcing co-design) and Type II (crowdsourcing design/government delivery platforms) due to the insufficient empirical research on Type III and Type IV. Types of crowdsourcing co-design are characterized by the active participation of citizens in designing public services through the process of sharing their ideas with a government before such public services or policies are formulated or implemented. In this type of crowdsourcing, government and citizens serve as co-designers of the content of public services and policies with the purpose of solving problems and making policies collaboratively (Nam, 2012). As discussed below, this review paper includes such cases as the Oasis platform run by the Seoul Metropolitan Government (SMG) (Lee & Kim, 2018), *My Linz* in Austria, *Open Government Dialogue* (Liu, 2017b), and *Challenge.gov* in the U.S., and *Aufbruch Bayern* in Germany (Wijnhoven, et al., 2015).

Types of crowdsourcing design/government delivery are characterized by citizens' active participation in designing service delivery

as a form of requesting services or filing complaints, and by the government's response to citizens' design needs as a form of providing feedback, solving service requests, and settling complaints. In this regard, citizens serve as street-level bureaucrats (Moon, 2018) or as information sensors (Clark & Brudney, 2014). Real-world cases include *311 services* in large cities in the U.S. (Clark, et al., 2013; Clark & Brudney, 2018; O'Brien, et al., 2016; Wu, 2020), *SmartBike* in Belgium (Müller, et al., 2021), *DigiTally* in Florida in the U.S. (Xu & Tang, 2020), *LookatLinz* in Austria (Schmidhuber, et al., 2017), and *Maeker Brandenburg* in Germany (Wijnhoven, et al., 2015).

III. Literature Review

It should be noted that literature review is limited primarily to empirical works that rigorously examined real-world cases of government crowdsourcing and thus, the selection of literature reviewed is neither comprehensive nor systematic, which is a limitation of this research. Table 2 shows a list of selected empirical works, including thirteen empirical studies, of which five investigated six unique cases of crowdsourcing/co-design platforms, and nine examined seven unique cases of crowdsourcing design/government delivery platforms.

1. Crowdsourcing co-design

In Type I, the review of five empirical studies revealed the following factors that affect

〈Table 2〉 List of Literature Reviewed

Author	Platform Name	Country	Typology of Crowdsourcing	Type of Participation
Berg, Gies, Groeneveld, and Kraaij (2020)	Unknown	Netherlands	Crowdsourcing Co-design	Casting a vote
Schmidhuber, Piller, Bogers, and Hilgers (2019)	My Linz	Austria	Crowdsourcing Co-design	Sharing of ideas, Feedback, Evaluation
Lee and Kim (2018)	Oasis	S. Korea	Crowdsourcing Co-design	Sharing of ideass
Liu (2017)	Open Government Dialogue	USA	Crowdsourcing Co-design	Accepted idea
Wijnhoven, Ehrenhard, and Kuhn (2015)	Challenge.gov	Germany	Crowdsourcing Co-design	Willingness to participate
Wijnhoven, Ehrenhard, and Kuhn (2015)	Aufbruch Bayern	Germany	Crowdsourcing Co-design	Willingness to participate
Schmidhuber, Hilgers, and Randhawa(Forthcoming)	A 311 type	Austria	Crowdsourcing design/ government delivery	Continued participation
Muller, Lerusse, Steen, and Vand de Walle (2021)	SmartBike	Belgium	Crowdsourcing design/ government delivery	Report via traditional means (phone and face-to-face), online (website and email), or mobile app
Wu (2020)	311 San Francisco	USA	Crowdsourcing design/ government delivery	Frequent use
Xu and Tang (2020)	DigiTally	USA	Crowdsourcing design/ government delivery	Report
Clark and Brudney (2019)	311 San Francisco	USA	Crowdsourcing design/ government delivery	Use of 311 to request services
O'Brien, Offenhuber, Baldwin-Philippi, Sands, and Gordon (2017)	311 Boston	USA	Crowdsourcing design/ government delivery	Report
Schmidhuber, Hilgers, Gegenhuber, and Etzelstorfer (2017)	LookatLinz	Austria	Crowdsourcing design/ government delivery	Frequency of reading, reporting, or commenting
Wijnhoven, Ehrenhard, and Kuhn (2015)	Maeker Brandenburg	Germany	Crowdsourcing design/ government delivery	Willingness to participate
Clark, Brudney, and Jang (2013)	311 Boston	USA	Crowdsourcing design/ government delivery	Use of 311 to request services

citizens' participation in crowdsourcing co-design platforms: government, citizen's motivation, participation behavior, crowdsourcing platform experience, social status, and demographic and socioeconomic status (SES).

1) Government

Some scholars (Berg, et al., 2020; Lee & Kim, 2018) have reported the importance of government responses, citizen participants' trust in government, and a government's

communication message as key government factors. Lee and Kim(2018) analyzed the 2009 survey data of 813 members of the *Oasis* platform run by the SMG. In 2006, the *Oasis* platform was created to enable the inhabitants of Seoul to participate in the setting of policy agenda by posting their ideas and sharing them with other peer citizens. Some ideas were formally accepted via a careful review process as new programs or policies by the SMG. They found that citizens' perception of government feedback played a significant role in the number of ideas they proposed via *Oasis*. These findings suggest that citizen participants are likely to submit more ideas when they perceive that government officials provide useful and timely feedback to their own ideas and those of their fellow peer citizens in a sincere manner. They also found that survey respondents tended to submit a greater number of ideas when they had greater trust and confidence in the SMG's efforts to operate in the best interests of society. However, they reported that the survey respondents' perception of fairness in crowdsourcing participation and access to information on *Oasis* were not significantly associated with the number of ideas.

Berg, et al.(2020) examined the relationship between the government's recruitment messages and citizens' participation measured by casting a vote for a local government's budget allocation via a government crowdsourcing platform. Regarding the contents of the government's communication with citizens, they expected that the communicating of social norms in recruitment messages would facilitate citizen

participation. In 2019, they conducted a field experiment with 6,066 citizens in the city of The Hague in the Netherlands. The experimental group received a letter of invitation including recruitment messages emphasizing social norms, formulated as follows: "*Decide together with your neighbors about the plans for your neighborhood.*" In contrast, the control group received the same letter without including any social norms. Contrary to their expectations, Berg, et al.(2020) found that the treatment group was less likely than the control group to cast a vote via a crowdsourcing platform, which suggests that recruitment messages that emphasize social norms decrease citizens' participation in co-allocating the government budget.

2) Citizens' motivation

Some scholars (Schmidhuber, et al., 2019; Wijnhoven, et al., 2015) examined the motivational factors that promote citizens' participation in government crowdsourcing platforms. Wijnhoven, et al.(2015) investigated three types of government crowdsourcing platforms, of which two - *Challege.gov* and *Aufbruch Bayern* - belong to a particular type of crowdsourcing co-design. Since 2010, *Challenge.gov* has served as a crowdsourcing co-design platform that allows federal government agencies in the U.S. to post their problems and seek solutions from citizens. It is characterized as a contest-based model of crowdsourcing platform in that citizen participants compete with one another, and the selected proposals receive cash rewards. Meanwhile, in Germany,

the state government-initiated crowdsourcing platform *Aufbruch Bayern* allows the citizens of Bavaria to propose ideas and suggestions in the areas of family, education, and innovation for the improvement of the State. As an incentive, the State of Bavaria funded ideas and suggestions that received positive feedback from the community. Wijnhoven, et al.(2015) collected and analyzed the survey data of 161 Germans in 2013 to understand the motivational factors influencing their decision to participate. They found that some motivational factors, such as helplessness beliefs (“Open government initiatives such as *Aufbruch Bayern* are too complex for me”), ideology, capacity-ability beliefs (“I do not have sufficient knowledge to participate in such open government initiatives such as *Aufbruch Bayern*”), and fun significantly affect survey respondents’ decisions on participation. In comparison with respondents who would not participate in *Challenge.gov*, those who did participate hold significantly stronger beliefs that (1) citizens in a democratic society should participate in *Challenge.gov*; (2) participation in *Challenge.gov* is a civic duty; (3) *Challenge.gov* initiative is not complex; (4) they have sufficient knowledge to participate in *Challenge.gov*; and (5) participation in *Challenge.gov* would be enjoyable. Wijnhoven et al. (2015) also found that in comparison with respondents who would not participate in *Aufbruch Bayern*, those who did participate had significantly stronger beliefs that (1) citizens in a democratic society should participate in *Aufbruch Bayern*; (2) participation in *Aufbruch Bayern* is a civic duty; (3) *Aufbruch Bayern* initiative is not expensive; (4) participation

in *Aufbruch Bayern* enables the individual (me) to change the environment, and (5) participation in *Aufbruch Bayern* would be enjoyable.

Schmidhuber, Piller, Bogers, and Hillers (2019) gathered and analyzed the survey data of 73 participants who had competed in the 2016 contest hosted in a government crowdsourcing platform called *My Linz*, in Austria. *My Linz* was created to promote citizens’ participation in sharing their ideas and contributing. It was designed to allow participants to collect points for sharing ideas, writing comments, and evaluating contributions and, in turn, to receive small awards upon accumulating a high number of points. Schmidhuber and her colleagues (2019) applied a self-determination theory of motivation with four elements (i.e., external regulation, identified regulation, introjected regulation, and intrinsic motivation) to examine three forms of participation - sharing ideas, writing comments, and evaluating contributions. They reported that intrinsic motivation is positively related to sharing ideas, making comments/suggestions, and assessing the proposed ideas, which suggests that the survey respondents were likely to offer ideas, write comments, and express their likes/dislikes more frequently when they perceived participation in *My Linz* as something fun and exciting. External regulation is negatively associated with sharing ideas, but is positively related to evaluating contributions, which means that external pressures (e.g., meeting the expectations of friends and family, gaining recognition and respect from others) and material rewards (e.g., winning prizes) are less likely to motivate survey

respondents to propose a more significant number of ideas, but more likely to encourage them to express their likes/dislikes concerning the proposed ideas. They also found that identified regulation is negatively related to commenting on and evaluating ideas, which means that although the survey respondents valued and considered it essential to participate in *My Linz*, they were less likely to make comments and evaluate the proposed ideas. In other words, the participants' identification with the goal of *My Linz* does not appear to significantly motivate them to provide feedback to others. The other finding is that introjected regulation is negatively related to sharing ideas, making comments/responses, or evaluating ideas. When the respondents were motivated to register with *My Linz* because they felt that they should participate in it, and/or would feel guilty if they did not participate in it, those motivators (i.e., self-esteem and the feeling of being 'a good citizen') demotivated them to participate in *My Linz* by offering fewer comments and pressing the like/dislike buttons less frequently.

3) Participant behaviors

Some studies (Lee & Kim, 2018; Liu, 2017b; Schmidhuber, et al., 2019) found that a citizen participant's behaviors, such as boundary spanning, attention receiving, and platform experience, played a significant role in ensuring their successful participation in crowdsourcing co-design platforms. Liu(2017) identified the behavioral characteristics of citizens whose ideas were successfully accepted via the Open Government Dialogue (OGD) platform. As

a part of the Open Government Initiatives (OGI) adopted by the Obama administration, OGD was opened to the public from May 22-28, 2009 to engage citizens as government consultants in order to share their ideas about how to improve the three pillars of OGI, namely transparency, participation, and collaboration, in federal agencies. She collected data on the ideas submitted between May 22-28, 2009 using a web-crawling process. During that one week, among 4,000 registered individuals, 591 of them proposed 1,071 ideas, 1,015 comments were made, and 501 ideas were accepted. She found that boundary-spanning behaviors and attention receiving were significantly and positively related to the accepted ideas. That is, those participants who actively commented on the ideas that other participants submitted on different policy areas, and who received comments from other members in the OGD, were also likely to propose the accepted ideas. In addition, participants whose ideas had been accepted in the past were more likely to suggest the accepted ideas, while those who proposed ideas that had been rejected in the past were less likely to propose the accepted ideas. In other words, it is likely that ideas were accepted when the creators of ideas had already proposed the same accepted ideas earlier, while ideas were not accepted when the creators had previously proposed ideas. However, Liu(2017) found that making comments on others' ideas in other policy areas and receiving comments from others did not significantly enable repeated contributors (i.e., those who proposed more than one idea over multiple days) to submit the

accepted ideas.

4) Crowdsourcing platform experience

Empirical studies demonstrate mixed findings regarding the role of the crowdsourcing platform experience (Lee & Kim, 2018; Liu, 2017b; Schmidhuber, et al., 2019) in promoting citizens' participation via a crowdsourcing co-design type of platform. Schmidhuber and her colleagues (2019) found that people who had already participated in an ideas generation platform in the past were more likely to post a greater number of ideas, comments/responses, and evaluations (e.g., likes/dislikes) through *My Linz*. In a similar vein, Lee and Kim (2018) found that survey respondents who had been members for a longer period and frequently visited *Oasis* in SMG tended to suggest more ideas. Liu (2017), however, found that platform experience - measured as the day spent - is negatively related to accepted ideas. That is, frequent participation in a government crowdsourcing co-design platform is likely to increase the possibility of submitting more ideas, but it does not necessarily result in the submittal of acceptable ideas.

5) Social factor

Lee and Kim (2018) found that a survey sample of *Oasis* members who have strong social ties with their family, friends, and co-workers were less likely to actively participate in the *Oasis* platform as a form of posting ideas. In other words, *Oasis* members who are weakly connected to offline social networks are more likely to suggest more ideas. Those who have

more volunteer experience, however, are not significantly related to the number of ideas posted.

6) Demographic and SES

A demographic factor often involves gender, age, and race, while SES refers to the social class of an individual or group that includes education, income, and occupation. Overall, studies reported mixed findings regarding the role of demographic and SES in promoting citizen participation in crowdsourcing co-design platforms. Regarding gender, some studies have reported that men are more likely than women to post more suggestions via *Oasis* (Lee & Kim, 2018). Meanwhile, women are more likely than men to offer comments and responses and likes/dislikes in *My Linz* (Schmidhuber, et al., 2019). However, others found that men and women are not different in their willingness to participate (Wijnhoven, et al., 2015), post a number of ideas (Schmidhuber, et al., 2019), or cast a vote for a project funded by a local government budget (Berg, et al., 2020). In a similar vein, empirical studies show that the relationship between age and participation in crowdsourcing co-design platforms is inconsistent. Some scholars (Schmidhuber, et al., 2019) reported that in comparison with middle-aged people (30-59), older people (60 and older) are less likely to make comments/responses, while younger people (below 30) are less likely to post a more significant number of posts, comments/responses, and likes/dislikes. Other scholars (Lee & Kim, 2018) have reported that older people are more likely than the young to post more

proposals/suggestions via *Oasis*. A recent study (Berg, et al., 2020), however, demonstrated that there is a curvilinear relationship between age and crowdsourcing participation. That is, middle-aged people have a more vested interest compared with the young or the elderly. Lastly, Lee and Kim (2018) found that citizens with above-median household income tended to actively participate in *Oasis* of the SMG by posting more proposals and suggestions.

2. Crowdsourcing design/government delivery

In Type II, nine studies that examined seven unique crowdsourcing design/government delivery platforms were identified. As discussed earlier, this research categorizes key factors into government, citizens' motivation and behavior, technology, demographics, and SES.

1) Government

Relatively, few studies have attempted to identify the government factors that affect citizens' participation in this type of crowdsourcing platform. Schmidhuber and her colleagues (forthcoming) examined the role of government feedback in citizen participation by focusing on the effect of the government's reasons for denying a citizen's initial request on continued participation and the total number of service requests in a 311-type of crowdsourcing in Austria. They applied attribution theory to discuss the different causes of denial of citizens' initial service requests (i.e., locus of causality, stability, and controllability) and to understand how different types of reasons influence citizens'

follow-on requests and intensity of requests. They categorized three causes of denial of a citizen's initial request (locus of causality). The initial request can be denied because a citizen fails to provide full information, the current solution is adequate, or a change is not needed. In this case, the locus of causality is internal. The denial of an initial request happens due to a lack of government responsibility (e.g., a problem is located at another organization; the problem is not solved by government but rather forwarded to a responsible organization), and legal issues (e.g., traffic safety). In this case, the locus of causality is external. Lastly, citizens' initial requests can be denied because the government lacks resources, the request is not prioritized or postponed, or the government does not mention explicit reasons. Then, the locus of causality belongs to the government. When the locus of causality is external, the reasons for the denial of a request are unstable, which means that the lack of government responsibility or legal issues is unlikely to change soon. Meanwhile, the reasons for the denial are stable when the locus of causality is either government or internal, which means that the lack of resources, request postponed, or a citizen's failure to provide full information can be changed at a later stage. The cause of denial is controllable when solving service requests mainly depends on the government's willingness, whereas it is uncontrollable when a government cannot change such reasons as a lack of government responsibility or a citizen's failure to provide full information.

In an analysis of longitudinal data on

service requests reported between 2013 and 2018, Schmidhuber and her colleagues (forthcoming) found that in comparison with the government's locus of causality, citizens' internal locus of causality (e.g., failure to provide full information) has no significant effect on citizens' follow-on requests, but it does significantly increase the number of requests. That is, citizens were likely to post a greater number of service requests even though their initial requests had been denied due to an internal locus of causality. When citizens' initial requests were denied due to an external locus of causality (e.g., lack of government responsibility), the probability that they would continue to request services and the total number of requests increased significantly compared to the government locus of causality.

They also reported that stability is likely to increase the total number of requests. When a citizen's initial service request is denied because the causes of denial are unstable (e.g., missing information from citizens, resource constraints), a citizen is likely to report more requests. However, although the probability of being unstable is slightly higher than that of being stable, it is not significant. Uncontrollability was found to have negative effects on both follow-on requests and the total number of requests, which means that when initial requests were denied due to factors beyond government control (e.g., lack of government responsibility, a citizen's failure to provide full information), both the probability of continuing to request a service and the total number of service requests decreased. In other words, even when citizen

requests are denied due to controllability (e.g., resource constraints), citizens are likely to continue to post their service requests and submit more requests via the platform. This is probably because citizens comfortably accept a denial decision for which the government provides legitimate reasons (e.g., a lack of prioritization).

2) Citizens' motivation

Three studies reported that incentives, interest in community and platform, the attractiveness of open government, and psychological factors affect citizens' participation in crowdsourcing design/government delivery platforms. O'Brien, et al.(2017) addressed one of the central questions about the role of incentives in promoting citizens' participation in government crowdsourcing. They focused on two non-material incentives, the solidary (or territorial) incentive and the expressive incentive, in order to examine their impact on various forms of citizen participation (i.e., reporting, reporting in the home neighborhood, reporting from a neighborhood of work, reporting on a commute, reporting from a neighborhood of family/friends) in the Boston 311 service platform. Solidary or territorial incentives are measured by the extent to which citizens perceive that participating in 311 services benefits the community (e.g., enhancing their neighborhood or improving their community) and enforces social norms (e.g., making the neighborhood safer). Expressive incentives are measured by the extent to which citizens' civic activities (e.g., volunteering with a local

or national civic group, attending a meeting for a local community group or a government agency) and political participation (e.g., voting in the 2011 municipal election). Their analysis of a sample of 439 citizens in Boston shows that (1) citizens who participated in any report had a significantly greater motivation to benefit the community; (2) citizens who reported service requests in their home neighborhood via the 311 platform showed greater motivation to benefit the community and enforce social norms while being less involved in civic activities; (3) citizens who reported from a neighborhood of work or on a commute participated in civic activities more actively; (4) citizens who reported on a commute had a greater motivation to benefit the community, and, finally, (5) citizens who reported from a neighborhood of family/friends voted in a municipal election.

Schmidhuber and her colleagues (2017) studied the factors that drove citizens who had registered on the *LookatLinz* platform to participate in platform activities such as reading, commenting, and reporting posts on infrastructure problems. They considered reading and commenting as passive participation, and reporting as interactive participation. Since 2013, the Austrian city of Linz has run *LookatLinz* to allow citizens to report maintenance issues (e.g., potholes) online or via a mobile application, and nearly 3360 reports have been posted on the platform each year. To understand platform users' motivation to participate, they focused on two motivators, i.e., 'interest in community and platform' and 'open government attractiveness'.

Interest in community and platform concerns users' intrinsic interest in exchanging ideas with other community members and using similar platforms, and their enjoyment in participating and communicating with each other via the platform. Open government attractiveness refers to the extent to which platform users believe that they are able to forward their concerns easily to their local government and want to contribute to city improvement.

By analyzing the survey data of 773 samples in 2014, Schmidhuber, et al. (2017) found that interest in platform and community is significantly and positively related to overall platform activity, frequency of reading, and frequency of commenting, but it is not significantly associated with frequency of reporting. This finding suggests that citizens who have higher levels of interest in platform and community (e.g., "I use the platform *LooatLinz* as I like sharing my opinions when I disagree") are likely to participate in a reactive, rather than an interactive, way. They also found that open government attractiveness is significantly and positively associated with frequency of reporting and overall platform activity, but its relationship with the frequency of reading and commenting is not significant. That is, people who perceive that open government is attractive (e.g., "I use the platform *LooatLinz* as I can forward my concerns to local government easily") are likely to participate interactively, but not in a reactive way.

As discussed earlier, Wijnhoven, et al. (2015) examined three types of government crowdsourcing, including *Maeker Brandenburg*.

As a citizen sourcing platform similar to the 311 type of government crowdsourcing platform, it is designed for citizens to report non-emergency services online. Upon analyzing the survey data of 161 Germans, they found that, in comparison with people who would not participate in *Maeker Brandenburg*, those who did participate held significantly stronger beliefs that the local government would implement their non-emergency service requests correctively and that participation in *Maeker Brandenburg* would be enjoyable.

3) Participant behaviors

As key participant behaviors, recent empirical research has identified frequent use of public services, satisfaction with community, and offline reporting experience. Wu (2020) investigated the relationship between the frequent use of public services and the use of the 311 service platform in the City of San Francisco. Using the survey data of 1,311 citizens who used the San Francisco 311 service platform, he found that the frequent use of public services is one particularly significant characteristic exhibited by those who used the 311 system more frequently. This finding implies that citizens who use public services provided by the City of San Francisco are more likely to participate in a 311 service platform more frequently. Moreover, Wu (2020) reported that satisfaction with the neighborhood environment is negatively related to the frequency of using 311 systems, which suggests that citizens who feel greater satisfaction with their neighborhood are less likely to participate in the San Francisco

311 service platform. In their studies discussed earlier, Schmidhuber, et al. (2017) found that offline reporting experience is significantly and positively related to the frequency of commenting, but is not significantly associated with frequency of reading and reporting. That is, people who registered with *LookatLinz* and reported infrastructural problems via traditional offline channels were likely to provide their comments on the posted report via the *LookatLinz* platform more frequently.

4) Technology

Some scholars (Schmidhuber, et al., 2017; Wu, 2020) examined the role of perceived technology characteristics in promoting citizen participation in a 311 type of government crowdsourcing. In particular, they focused on two key factors, 'perceived ease of use' and 'perceived usefulness', in the Technology Acceptance Model (David, 1989). Perceived usefulness/benefit (e.g., "My concerns are processed and dealt with quickly thanks to *LookatLinz*") was found to be a significant factor of platform activity and frequency of reading (Schmidhuber et al., 2017). The finding suggests that citizens who perceived *LookatLinz* as a useful channel were likely to participate more actively in platform activities in general and to read other users' service requests more frequently. Regarding perceived ease of use, Wu (2020) found that San Francisco 311 users requested services via the web or a mobile app more regularly when they perceived that it could be used easily (e.g., "It is easy to request a City service on the web or a mobile device").

Meanwhile, Schmidhuber, et al. (2017) found that perceived ease of use (e.g., “*LookatLinz* is clearly arranged”) is not significantly related to platform activity or frequency of reading, commenting, and reporting.

5) Crowdsourcing platform experience

Regarding critical crowdsourcing platform experience, prior research found that satisfaction with mobile applications, membership length, and frequency of service use play a significant role in citizen participation. Muller, Lerusse, Steen, and Van de Walle(2020) examined the relationship between three measures of platform experience (i.e., satisfaction with mobile applications, membership length, and frequency of service use) and channel choice (i.e., e-government, traditional, or m-government channels) when using the *SmartBike* platform. Since 2011, the City of Flanders in Belgium has provided the *SmartBike* platform to allow citizens to report service-related issues while sharing bikes with other peer citizens. By analyzing the data of 3,530 *SmartBike* users collected from multiple sources (i.e., survey and log data), Muller, et al. (2020) reported that *SmartBike* users who were satisfied with the mobile government (m-government) channel (i.e., mobile application) were less likely to report service-related issues via traditional (i.e., phone and office visit) or e-government (i.e., website and email) channels. However, *SmartBike* users with longer membership status were more likely to choose traditional or e-government channels over m-government channels. Lastly, they found that *SmartBike*

users were more likely to request services via a traditional channel rather than m-government channels when they used it more frequently.

6) Demographic and SES

(1) Gender

The majority of empirical studies reviewed in this research show that men and women are equally represented in terms of participation in a crowdsourcing design/government delivery type of platforms. Schmidhuber and her colleagues(2017) found that men were more likely than women to engage in overall platform activity and participate more actively by reporting more frequently in the *LookatLinz* platform, but that they were not different in terms of frequency of reading and commenting. Other studies (Clark & Brudney, 2018; Müller, et al., 2021; Schmidhuber, et al., 2017; Wijnhoven, et al., 2015), however, observed no gender difference in terms of using a crowdsourcing design/government delivery type of platform. In terms of preference of participation channel, Muller, et al. (2020) found that women were more likely than men to report service-related issues via the traditional and e-government channels, while men preferred mobile applications as a means of government crowdsourcing participation.

(2) Age

Some scholars reported that the elderly are more likely than the young to participate in a crowdsourcing design/government delivery type of platforms (Müller, et al., 2021; Schmidhuber, et al., 2017). Schmidhuber, et al.(2017), for instance, found that the elderly (over 50 years

old) were more likely than younger people to engage in online platform activities such as reading, commenting, and reporting. Muller and his colleagues(2020) also stated that older users were more likely than younger users to report service-related issues via traditional and e-government channels than via m-government channels.

(3) Education

Concerning the role of education, mixed findings have been reported. Thus, there is insufficient evidence that citizens with different levels of education are equally represented in crowdsourcing design/government delivery platforms. Clark, Brudney, and Jang (2013) analyzed the services requested of the 311 system of the City of Boston. In comparison with neighborhoods where a high percentage of the population lacked a high school diploma or GED, they found that neighborhoods with a greater percentage of population with a Bachelors' degree or higher tended to report a greater number of service requests via the 311 Boston website. But, they tended to report fewer service requests via the 311 Boston mobile application. In their recent study on users of 311 systems in San Francisco in 2011, 2013, and 2015, Clark and Brudney (2018) reported that the users' level of education was not significant in terms of the use of 311 systems between 20011 and 2013, but that it became significant in 2015. Schmidhuber, et al.(2017), however, reported that citizens with a lower level of education were likely to read other citizens' reports more frequently. In a similar

vein, Xu and Tang(2020) observed that residents living in neighborhoods with a lower level of education were more likely to request services such as power restoration via *DigiTally*, a 311 type of crowdsourcing platform run by the City of Tallahassee, Florida, since 2013. Other studies (Schmidhuber, et al., 2017; Wijnhoven, et al., 2015), however, suggest that people with higher or lower levels of education were equally represented in government crowdsourcing platforms. In their analysis of the survey of German citizens, Wijnhoven, et al.(2015) found that there was no significant relationship between level of education and crowdsourcing participation in *Maerker Brandenburg*. Moreover, in their analysis of crowdsourcing platform users in the City of Linz, Austria, Schmidhuber, et al.(2017) reported that those users' education levels did not significantly affect their overall crowdsourcing activity and frequency of commenting and reporting. Furthermore, Muller and his colleagues(2020) found that education does not appear to predict citizens' choice of mobile application as a means of participating in the *SmartBike* platform.

(4) Household income

Scholars have reported mixed findings concerning the role of household income in citizens' participation in crowdsourcing design/government delivery platforms. In their analysis of the surveys of citizens of San Francisco, Clark and Brudney(2019) found that an individual's household income did not significantly affect participation in the San Francisco 311 platform. Xu and Tang(2020), however, reported that

residents living in lower household income neighborhoods requested more power restoration services through DigiTally.

(5) Employment

Overall, recent empirical studies have reported that there is no significant relationship between employment and citizen participation in crowdsourcing design/government delivery platforms, which implies that an individual's employment status is represented in crowdsourcing design/government delivery platforms (Müller, et al., 2021; Schmidhuber, et al., 2017; Wijnhoven, et al., 2015). Wijnhoven, et al.(2015) observed that German respondents' employment status (i.e., full-time employed, part-time employed, unemployed, student, and pensioner) was not significantly related to their willingness to participate in Maerker Brandenburg. Schmidhuber, et al.(2017) also found that the employed did not differ significantly from the unemployed in their overall crowdsourcing activity and their frequency of reading and reporting. But they reported that the employed were more likely than the unemployed to offer comments on other peer citizens' reports more frequently. Muller, et al.(2020) reported that, compared to professionally inactive users, professionally active users were less likely to report service-related issues through traditional channels compared to mobile applications. Meanwhile, they found that employment status (i.e., professionally active or inactive users) did not predict their choice to participate in crowdsourcing via websites over mobile applications.

(6) Race/Ethnicity

As discussed earlier, Xu and Tang (2020) examined who reported power outages via the *DigiTally* 311 platform in Tallahassee and who received power restoration services quicker. They reported that historically minority households were more likely to request power outage restoration via the *DigiTally* 311 service, yet it took a significantly longer time for minority households to receive power restoration responses than non-minority households. This is because they only had access to "poor infrastructure, such as poorly maintained trees, grid systems, and roads" (Xu & Tang, 2020: p. 970).

IV. Implications and Conclusion

Based on the findings of this study's literature review, the implications are systematically discussed by linking critical factors to a type of participation - simple, interactive, intensity, and continued participation.

1. Crowdsourcing co-design

First, citizens' intention to use new technology has been identified as a critical determinant of actual use (Davis, 1989) or has been used as a proxy for the actual use of new technology. Government crowdsourcing platforms are relatively new, technology-enabled, co-production systems. In this regard, it is practical for government leaders and managers to understand the factors that shape citizens' intention to participate in government crowdsourcing

platforms. As a form of simple participation, the findings of Wijnhoven, et al.(2015) imply that citizens who have the intention to participate in crowdsourcing co-design platforms believe that citizen participation is an important means of fulfilling one's civic duty in a democratic society and thus expect a pleasant experience.

Second, crowdsourcing co-design platforms can be characterized as a useful means of achieving collective intelligence through citizen-to-government and citizen-to-citizen interactions, and hence of collaboratively designing sensible and relevant public policies, programs and services. Therefore, interactive participation activities such as idea sharing, feedback, and evaluation are pivotal to the success of crowdsourcing co-design platforms. The findings presented in recent empirical studies (Lee & Kim, 2018) imply that citizens' interactive participation - the sharing of ideas in particular - can be facilitated when government agencies and officials can boost citizens' trust in government, and commit to providing sincere feedback on ideas submitted by citizens. Certain findings (Schmidhuber, et al., 2019) also suggest that the use of material rewards as a means of promoting competition among participants should only be used strategically, because such an approach could discourage some citizens from sharing their ideas more frequently. However, material rewards (if designed to reward citizens for their activities, such as the evaluation of others' ideas) are likely to encourage them to engage in relatively less-time consuming activities such as assessing other ideas more frequently

simply by pushing the 'like' or 'dislike' button. In fact, such material incentives could lead citizen participants to attempt to gain rewards more easily, with the result that they might not read and assess the ideas of other peer citizens seriously.

Third, from the perspective of government organizations, one of the most important purposes of providing crowdsourcing co-design platforms is to receive innovative, relevant, and implementable ideas from citizen participants and to accept 'good quality' ideas and implement them. Accepted ideas enable citizens to experience 'success' in their participation endeavors, which means that they are likely to feel a sense of empowerment and participate more actively. In this regard, Liu's research(2017) implies that citizens' successful participation can be harnessed by the government's efforts to design, create, and manage a collaborative platform environment that encourages participants to span different policy areas, make comments on the ideas proposed by their peer citizens in other policy domains, and receive comments from other peer citizens in other policy areas.

2. Crowdsourcing design/government delivery

First, government leaders and managers must carefully formulate and implement their promotion strategies by incorporating solidary and expressive incentives while encouraging citizens to participate in this type of platform. O'Brien, et al.(2017) suggested that solidary and expressive incentives encourage citizens

to request non-emergency services located not only in their home neighborhoods but also in broader jurisdictions within their communities, which provides governments with an opportunity to provide services to broader community areas where such service requests may not be reported by the underserved.

Second, to encourage citizens' active participation in crowdsourcing design/government delivery platforms, Schmidhuber, et al.(2017) implied that government agencies should design their platforms in ways that make them more attractive to citizens (e.g., help them perceive that they can forward their concerns easily to their local government via the platforms), so that they can participate interactively as a form of reporting community problems more frequently. Their studies also suggest that government leaders and managers should design and manage the platforms to cultivate and strengthen citizens' interest in the platform and community as a way of inducing or persuading them to read other peer citizens' service requests and make comments on them.

Third, citizens' service requests submitted via the platform can be denied by the government for one reason or another. As such, government leaders and managers should pay more attention to how government feedback affects citizens' initial participation and their continued contribution to crowdsourcing design/government delivery platforms. Schmidhuber, et al.(forthcoming) offer some insights to the effect that when citizens receive denials of their initial service requests from the government due to their own errors (e.g., missing information), or the government's failings (e.g., lack of resources), or other issues (e.g., outside

the scope of the government's responsibilities), they are likely to continue to request services via the platform as long as the government provides feedback on the reasons for denial.

When citizens participate in a government crowdsourcing platform (e.g., as a form of requesting non-emergency services) and government agencies respond to their participation efforts, these citizens are likely to enjoy better government-citizen co-production processes and outputs. Conversely, if citizens do not participate in the platform, they are less likely to receive timely government responses. These variations in citizens' participation in government crowdsourcing platforms can lead to unequal opportunities for citizens to co-produce public services and co-create public values with the government. Without conscious efforts on the part of government to resolve this issue, unequal opportunities are likely to persist or worsen.

To conclude, regarding the role played by citizens in crowdsourcing design/government delivery platforms, citizens serve as street-level bureaucrats who observe, detect, and report problems in their neighborhoods and communities. Some citizens request non-emergency services (e.g., potholes, abandoned vehicles) via crowdsourcing design/government delivery platforms such as a 311 service platform, while others do not. Among the citizens who request such services, some request them more frequently, while others do so less often. Furthermore, some citizens continue to participate in crowdsourcing design/government delivery platforms, whereas others discontinue

their participation. When citizens participate in a government crowdsourcing platform (e.g., requesting non-emergency services) and government agencies respond to their participation efforts, these citizens are likely to enjoy better government-citizen co-production processes and outputs. Conversely, if citizens do not participate in the platform, they are less likely to receive timely government responses. These variations in citizens' participation in government crowdsourcing platforms can lead to unequal opportunities for citizens to co-produce public services and co-create public values with the government. Without conscious efforts on the part of government to resolve this issue, unequal opportunities are likely to persist or worsen.

There are at least three areas of future research. Future research should pay more attention to citizens' awareness of opportunities to participate in a government platform. Some citizens do not participate in government crowdsourcing simply because they are not aware of such opportunities. Although the government has made considerable efforts to increase citizens' awareness of these new co-production platforms using various promotion channels, little is known about which types of promotional efforts and channels (e.g., online banner, advertisement via mass media) will have more positive effects on citizens' participation. Future studies also need to advance our understanding of the impact of citizen participation in government crowdsourcing on citizens' behaviors and perceptions, such as transparency and trust in government, as well as government officials' behaviors and their

perceptions (e.g., trust in citizens) of citizens in general and of citizen participants in particular. Lastly, this study focuses on empirical research on Type I and Type II crowdsourcing platforms. Future studies are encouraged to examine the factors that affect citizens' participation in Type III and Type IV crowdsourcing platforms.

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