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The Effects of Citizen Knowledge on the Effectiveness of Government Communications on Nuclear Energy Policy in South Korea

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Abstract: By analyzing survey data on nuclear energy policy in South Korea, this study examined the influence of citizens' knowledge on the perceptions of and attitudes to government communication initiatives that are characterized by symmetry and transparency, and their effects in developing institutional legitimacy and policy acceptance. The findings indicate that symmetrical and transparent communication are involved in forming institutional legitimacy and policy acceptance of government decisions on the controversial topic of nuclear energy, but the process differs depending on citizens' knowledge of the topic. Well-informed citizens who used reasoning were more likely than others to respond positively to symmetrical and transparent communication, which shaped their support for institutional legitimacy and policy acceptance on nuclear energy policy issues. These findings provide some of the first empirical evidence of the effectiveness of government communication.

Keywords: symmetrical communication; transparent communication; government–citizen relationships; institutional legitimacy; policy acceptance; citizen knowledge

1. Introduction

With an emphasis on citizen participation in administrative decision-making and management, government communication has become one of the core managerial functions facilitating citizen access to and the exchange of information [1,2]. Scholars have investigated the critical role of government communication in the context of internal organizational communication [3], service effectiveness [1], and communication strategy [4,5]. Providing public information to citizens influences their perceptions of and attitudes to government, such as government trust [6], service effectiveness [7], and legitimacy [8]. These studies suggest that government efforts to communicate and interact with citizens improve citizens' attitudes toward governmental activities. Government communication is essential to ensure government accountability and democratic governance.

However, despite the literature on the importance and impact of government communication, understanding of the relationship between government communication and citizen attitudes is relatively fragmented. Little research has addressed the ways in which external government communication affects citizens' perceptions of and attitudes toward government. Furthermore, while citizens' knowledge plays a critical role in their processing of public information [6,9–11], the literature overlooks the influence of citizen knowledge on the effectiveness of external government communication.

To address these issues, we compared citizens with high knowledge and low knowledge. Specifically, we proposed a structural relationship between government communication and citizen attitudes. From a relational perspective, communication can be pivotal in cultivating symbiotic and trust-based relationships between organizations and citizens, thereby achieving organizational missions and goals [4,12]. Government communication

can improve the relationship between government and citizens [13], affecting citizens' perceptions of and attitudes toward government. Thus, government communication efforts have close links with citizen attitudes, and the government–citizen relationship mediates them.

Based on a structural model of the effectiveness of government communication in modifying citizen attitudes, the current study built upon and extended the understanding of government communication by incorporating citizens' knowledge as a key determinant. Citizens' perceptions of and attitudes to the government operate within the limits of their cognitive abilities and the bounds within which they interact [9,10], which implies that citizens' knowledge of government activities influences their attitudes toward government. Differences in knowledge between citizens appear to depend on government communication effectiveness. In this respect, the authors ask: How does citizens' knowledge affect the process of government communication effectiveness?

To explore the differential effects of citizens' knowledge on the link between government communication and citizens' attitudes, this study focused on variables such as symmetrical communication, transparent communication, government–citizen relationships, institutional legitimacy, and policy acceptance. The context of this study is nuclear energy policy in South Korea, where the central government encourages citizens' participation in communication because many citizens recognize the dangers of and oppose the use of nuclear power after the disaster at Fukushima in Japan in 2011 and the earthquake in southeastern Korea in 2016 [14,15]. To relieve the public's concerns and to increase the acceptance of the existing nuclear policy, governments are trying to enhance citizen participation in the policymaking process and to provide more information to external stakeholders [15]. Thus, this is an appropriate context in which to look at the distinctive role of citizen knowledge in the effectiveness of government communication.

We expect to make two contributions to the literature. First, this study enriches the understanding of the way government communication affects citizen attitudes, such as institutional legitimacy and policy acceptance. Through this relative perspective, this study provides more simultaneous and extensive data on the effectiveness of government communication. Second, it enhances the literature on citizen knowledge. Previous studies have examined the impact of citizen knowledge on managerial efforts by providing unfamiliar public information on a hypothetical service. Like prior surveys, by employing citizens' subjective knowledge on true nuclear energy issues, this study can provide stronger empirical foundations for the role of citizens' knowledge on the relationship between governmental activities and citizen perceptions of actual policy issues.

2. Theoretical Background and Hypothesis Development

2.1. Relationship Management Perspective

In the study of public relations, researchers have noted that building and maintaining a quality relationship between organizational and strategic constituents is essential to implement government initiatives and programs effectively [16,17]. Organizations must sustain relationships with their stakeholders to achieve organizational goals. From this perspective, the basis of an organization's public relationships is reciprocal understanding and mutual respect that sustain an ongoing interchange of needs and their fulfillment [18]. In particular, as a strategic function of managing interaction, engagement, and relationship with key publics, such as citizens, government communication significantly influences publics' perceptual, cognitive, emotional, and behavioral responses [5,19,20].

Recently, public relations scholars and practitioners have concluded that to develop truly significant, meaningful, and mutually beneficial relationships, government communication needs to involve the application of genuine symmetrical and transparent communication principles and practices [12,21]. Indeed, many government project and program failures might be the direct or indirect result of a lack of symmetrical and transparent communication, which hinders stakeholders from creating a horizontal process that facilitates civic engagement, reduces misunderstanding and conflicts, and builds trust and

social capital [22,23]. Indeed, prior studies have shown that the strategic use of symmetrical and transparent communication can be a key driver of the maintenance of relationships between the government and specific target groups because it not only enables information availability, visibility, and inferability but also constructs perceptions and attitudes for effective and ethical action among stakeholders [8,9,13,24]. On this basis, the authors argue that governments should symmetrically and transparently communicate with citizens for democratic governance.

2.2. Government Communication and Government–Citizen Relationships

The definition of symmetrical communication is an organizational willingness to maintain an adjusted, balanced relationship that is rooted in empathetic listening, information symmetry, mutual confirmation, and timely responses to the interests and concerns of its publics [17]. Theoretically, the basis of symmetrical communication is a worldview that regards communication as informational interaction and ethical dialogue in which two or more systems shape belief systems, values, judgments, evaluations, choices, and behavior in a symbiotic and synergistic approach [16,18,21]. Hence, communication symmetry is the strategic use of government initiatives and programs to facilitate trust, openness, a horizontal process, reciprocity, negotiation, conflict resolution, and dialogue between stakeholders [4,19,25]. More specifically, in the context of the public sector, symmetrical communication is not simply about delivering policy information and discussing public issues but is also about enabling a communicative ecosystem in which stakeholders can generate and exchange their opinions and knowledge as a path to collective meaning- and decision-making [2,20].

Meanwhile, given citizens' low government trust and their undervaluation of public performance, public institutions increasingly employ the concept and practice of transparency as a remedy and intervention to achieve desirable goals, such as accountability, legitimacy, and trust [26–28]. Many believe that transparency fosters citizens' ability, motivation, and opportunity to observe and understand what is happening within public organizations [26,28]. Governments can enhance transparency by providing citizens with relevant information on government procedures, functioning, decisions, and performance in a timely, useful, and comprehensive way [8,23]. They can facilitate transparency through government communicative efforts by activating and promoting the availability, accessibility, dissemination, visibility, and comprehensibility of government policy information, which can increase the quality of participatory, deliberative, and collaborative governance [23,27].

Communication aimed at achieving organizational transparency includes the use of substantial information, participation, and accountability [13]. The substantial information concerns the amount and type of information stakeholders need. Information that is truthful, comprehensible, and useful, and that meets the information needs of all the parties or stakeholders involved is necessary to achieve transparency [13]. Participation refers to stakeholder engagement, interaction, and feedback in effectively identifying and obtaining the information necessary for decision-making [13]. It is difficult to achieve organizational transparency without inviting stakeholders to engage and fulfill their informational needs. Lastly, accountability in transparency means that objective and balanced information on the organization and its activities, including both favorable and unfavorable policy results, is available to stakeholders in communications [13]. Transparent communication can be an excellent mechanism for paving the way for further improvement of stakeholder relationships, the legitimacy of the policy and decision processes, and organizational reputation [23,25,27].

Stemming from the arguments above, the authors argue that the strategic application of government communication, such as symmetrical and transparent communication, facilitates high relationship quality between government organizations and citizens. Additionally, the authors expect that symmetrical communication may act indirectly on quality relationships through the mediating role of transparent communication pertaining to the

government–citizen relationship maintenance process. Specifically, while symmetrical communication is a crucial precondition for relationship maintenance by enhancing trust, commitment, tolerance, reciprocity, collaboration, and cooperation between constituencies, transparent communication affects an individual's ability and/or motivation to invite informational and participatory behaviors in response to the government communication messages (e.g., arguments, factual evidence, supplemental disclosure) that are necessary for the relationship maintenance process [8,9,13,29]. Without transparent communication, the effectiveness of symmetrical communication by a government in cultivating quality relationships may be limited or less feasible. Thus, this study proposes the following hypotheses:

Hypothesis 1 (H1). *Symmetrical communication is positively related to transparent communication.*

Hypothesis 2 (H2). *Symmetrical communication is positively related to the government–citizen relationship.*

Hypothesis 3 (H3). *Transparent communication mediates the relationship between symmetrical communication and the government–citizen relationship.*

2.3. Influence of Government–Citizen Relationships

As mentioned earlier, the relational perspective applied to the literature of public relations concerns managing stakeholder relationships effectively for mutual understanding and benefit for multiple interested parties [12,16,30,31]. The extant literature suggests a need to redefine the concept of government–citizen relationships as a communication process of maintaining mutually beneficial participation and collaboration [24,32]. For example, citizens are a legitimate and sustainable force for promoting democratic governance values, such as effectiveness, legitimacy, and social justice, since civic attitudes, behaviors, and participation explicitly or implicitly address the multifaceted challenges of contemporary governance and the deliberative process linked with public policy [2,30,33]. Furthermore, citizens are the living faces and counterparts of government organizations given that they convey meanings and signals with regard to government activities and performance to other stakeholders with whom the government interacts [31]. Therefore, government–citizen relationships can function as a communication mechanism to help governments to enhance public confidence, create greater stakeholder interaction and engagement, and improve democratic governance values in a substantive and timely manner [30,32].

Previous studies have demonstrated that a positive relationship between an organization and its key publics has a close association with positive perceptions and attitudes [2,31,34]. For example, Ledingham suggested that the quality of government–citizen relationships, as reflected and sustained by government communication initiatives, produces substantive benefits to good governance by improving residents' views of the role of government in local communities [12]. Some prior studies have also shown that organizations that support well-nurtured relationships with their key constituencies are likely to reduce organizational vulnerability to organizational crises, such as financial, perceptual, or reputational damage, particularly in turbulent and complex situations [33]. They also found that citizens with more positive relational perspectives on government service and performance are more likely to be information agents or communicative ambassadors who help governments to establish favorable reputations and images [34].

In this vein, it is likely that the relationship quality that government organizations have with their strategic publics not only contributes to tangible performance outcomes but also helps to improve intangible organizational assets, such as citizens' perceptions of and attitudes toward government activities. If citizens have established favorable relationships with their government institutions, they are likely to have positive perceptions of, belief systems about, values concerning, and behaviors toward government affairs, issues,

programs, and even problems, and they are thus likely to comply with and participate in government policies and initiatives.

Hypothesis 4 (H4). *Government–citizen relationships are positively related to policy acceptance.*

2.4. Institutional Legitimacy and Policy Acceptance

Suchman defined legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" [35] (p. 576). This conceptual definition indicates that legitimacy is an "operational resource" of the organization that is essential to the functioning of organizations [36] because organizational practices can develop, strengthen, maintain, or even destroy legitimacy [37,38]. As an organization continuously interacts with its audience to maintain its legitimacy, this view of legitimacy also emphasizes a degree of fit between the attributes of the organization and its environment [35,36]. To preserve legitimacy, organizations make an effort to maintain congruence with external environmental pressures. Legitimacy is an intangible asset an organization acquires from social interactions with its stakeholders [36]. Within the organizational practices and the social context in which they occur, the basis of perceived legitimacy is the beliefs and perceptions of citizens regarding the actions and behaviors of the organization.

Meanwhile, a few studies have noted that as a critical strategy to maintain legitimacy, organizations should communicate with their external constituents to reflect environmental pressures [37,39,40]. However, it takes time to develop and extend perceived legitimacy [8]. Moreover, government communication reveals the process and operationalization of legitimation, not legitimacy [40], through providing information about how the organization behaves concerning a particular issue and agenda. Viewing legitimacy as an intangible asset of an organization, the authors propose that institutional legitimacy varies as a result of social interaction and information exchange between an organization and citizens, which is influenced by the quality of government–citizen relationships formed by government communication. In other words, communicative efforts indirectly shape citizens' perceptions of legitimacy through the quality of government–citizen relationships.

With regard to the importance of legitimacy, the extant literature has shown that as the perceived rightfulness of authorities, legitimacy facilitates public compliance with public policy [38]. When public organizations rest on legitimacy, citizens feel an obligation to uphold laws and to accept policy decisions "as legal and authoritative" [41] (p. 63). Consequently, perceived legitimacy is critical in predicting the success of government activities, as it promotes compliance from citizens [42].

Based on the arguments above, we predicted that institutional legitimacy plays a mediating role in the association between government–citizen relations and policy acceptance. Previous studies have shown that constructing a quality government–citizen relationship and building institutional legitimacy have significant associations with the enhancement of citizens' acceptance of government intentions and actions [33,36,37,39]. That is, nurturing a relational capital composed of trust, accountability, collaboration, cooperation, a sense of belonging, satisfaction, feelings of shared control, and commitment among constituencies may positively affect institutional legitimacy. Nevertheless, existing studies have not yet specifically investigated whether institutional legitimacy plays a mediating role [33,36,37,39]. Given the preceding arguments on the role of symmetrical and transparent government communication initiatives and government–citizen relationships relating to institutional legitimacy and policy acceptance, this study posited the following hypotheses:

Hypothesis 5 (H5). *Government–citizen relationships are positively related to institutional legitimacy.*

Hypothesis 6 (H6). *Institutional legitimacy mediates the relationship between government–citizen relationships and policy acceptance.*

2.5. The Moderating Role of Knowledge

Based on the proposed research model, the authors argue that the impact of citizens' prior knowledge on the provision of public information varies by the type of issue that determines citizens' effortful processing of information. In this sense, the authors explore the differences in government communication effectiveness in changing citizens' perceptions and attitudes by comparing citizens who have higher levels of knowledge regarding a particular policy issue with those who have lower levels of knowledge. In general, the extant literature observes a distinctive role of citizens' knowledge in explaining citizens' perceptions and attitudes toward governmental decisions and activities [8–11]. Although previous studies have provided mixed results, there is a widespread belief that government communication leads to varying degrees of citizens' knowledge.

Numerous studies on the role of individual knowledge (e.g., subjective knowledge, objective knowledge, familiarity, meta-cognition) have shown that individuals with higher levels of knowledge display greater confidence in processing incoming information properly and lead to better evaluations with existing knowledge [43]. Given that individual knowledge affects information processing patterns and outcomes, attitudinal formation and change, decision-making and choice, several findings in public administration and political science have demonstrated the significant role of knowledge in individual cognition, affect, and behavioral responses to government policy or organization, e.g., [44,45]. For example, Bok found that more knowledgeable citizens were less likely to be negative about government processes and outcomes and simultaneously cause a loss of trust [44]. Blendon et al. found that citizens with lower levels of knowledge about government policies and activities had more negative attitudes and perceptions [46]. Mondak et al. revealed that an individual's knowledge about a good government result was more likely to have a positive effect on trust in a government organization [47].

Indeed, a growing body of literature has argued that information campaigns and communication interventions that are aimed at enhancing citizens' literacy and comprehension of government, processes, and actions might be useful in leading to greater empathy, relationships, transparency, engagement, and trust in government [1,4]. Public administration studies demonstrate that public organizations' communication and information services can shape citizens' perceptions and expectations of government organizations' processes and actions [48]. Ho and Cho suggested that government communication effectiveness serves the key role of building up the quality of government–citizen relationships [1]. More recently, citizens' familiarity with symbolic government communication was found to be related to their attitudes and perceived performance of government organizations [4].

The Elaboration Likelihood Model (ELM) provides explanatory mechanisms for the moderating role of prior knowledge [6,11]. According to the ELM, which evolved in the study of social psychology, attitude change is likely to occur via one of two routes, namely, the central route or the peripheral route [49,50]. When people have the motivation and ability to understand an issue, they choose central route processing. People scrutinize the message, which involves deliberative and active information processes. Depending on whether the arguments are strong and compelling, attitude changes may take place. However, if people lack the motivation or ability to think carefully about the issue, they follow the peripheral route to persuasion. When deciding whether to agree with the message, people rely on incidental cues, such as the expertise or attractiveness of the speaker or their own current mood instead of the message the government provides.

Grounded in the ELM, existing studies have recently shown that the provision of policy information does not easily change the attitudes and perceptions of people who have substantial knowledge about a government policy because they already have an opinion about the issue based on prior knowledge and they do not consider the policy information as new [6]. However, people who have little knowledge of a government policy tend to change their attitudes more easily because their limited time and knowledge available for processing policy information may lead them to take the peripheral route to persuasion [6,11]. As a result, prior knowledge can play a role in mitigating the effects

of the provision of policy information on citizens' general attitudes, such as government trustworthiness [6] and red tape [11].

On the other hand, the public management literature notes that more knowledge leads to more positive attitudes toward a particular policy [10,51]. The provision of policy information helps people to become more familiar with a particular policy issue or agenda. Citizen knowledge contributes to an understanding of the underlying policy rationale, expected benefits, and relevant advantages and disadvantages [10], which affects citizens' perceptions and attitudes. A positive association between knowledge and attitude exists in various policy areas, such as social policy [52], transportation [10], environment protection [53], and public health [51]. That is, the greater the citizens' knowledge about a given policy is, the greater their policy acceptance will be.

Taken together, the authors argue that unlike citizens' general attitudes toward a government in terms of citizen attitudes on a particular policy issue, government communication as one of the primary sources of policy information may be more effective for people with higher levels of knowledge since they are likely to follow a different persuasion process due to their motivation and their ability to think about the topic. As motivation and ability are prerequisites for the central route, these citizens tend to think carefully about government communication messages. Per the ELM, "attitude changes are stronger the more they are based on issue-relevant thinking" [50] (p. 48). If citizens encounter a policy issue in which they are interested, they are more likely to focus on the policy information based on their pre-existing knowledge. As people consciously and carefully think through the arguments, people who have higher levels of knowledge about the policy issue can substantively interpret and elaborate upon the policy information that government communication initiatives present. To sum up, the effects of government communication are likely to be stronger among people who have higher levels of knowledge about the policy issue than their counterparts.

Furthermore, there are growing concerns about nuclear power safety in South Korea after the Fukushima nuclear accident in Japan [54]. Nuclear power can entail risks, including the environmental impact of radioactive waste and damage to public health. Nuclear power facilities are based on their acceptability to residents and citizens. In particular, given South Korea's dependence on nuclear power for 22% of its total electrical generation capacity and 29% of its total electrical consumption [55], the public concerns about nuclear safety and the risk of environmental destruction can cause social conflicts and economic damage. Considering that citizens' knowledge of government activities influences their attitudes toward government [44,46,47], the Korean nuclear energy policy represents an appropriate context for examining the distinctive role of citizen knowledge of the effectiveness of government communication to promote social acceptance of nuclear power and its continued use. Thus, the authors put forth the following hypothesis:

Hypothesis 7 (H7). *Citizens with higher levels of knowledge will be more aware of the interrelationships between government communication initiatives (symmetrical communication and transparent communication), the quality of the relationship, and government outcomes (institutional legitimacy and policy acceptance).*

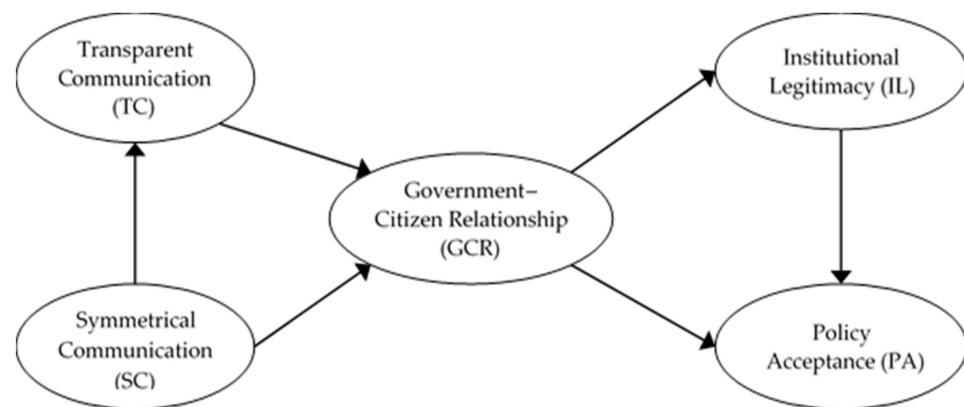The hypothesized research model was proposed as depicted in Figure 1.

Figure 1. Hypothesized research model.

3. Materials and Methods

3.1. Research Context

Because of insufficient domestic resources, South Korea relies on imports for its energy. For example, conventional energy sources, such as crude oil, natural gas, and refined petroleum products, accounted for over 20% of the value (appropriately $86 billion) of South Korea's annual import in 2015 [56]. Although as an alternative energy resource renewable energy is emphasized in the Korean energy policy, nuclear power still accounted for 22% of total electrical generation capacity in South Korea [55] because of its economic and environmental advantages over other energy resources [57].

After witnessing the large-scale disaster at the Fukushima nuclear power plant in Japan in 2011 and the earthquake in southeastern South Korea in 2016, public concerns about nuclear safety were further heightened in South Korea [54]. Amid the growing opposition to the Korean nuclear policy, the Korean government has recently started to discuss the policy issue with various stakeholders, including environmental groups and residents who live near nuclear energy facilities [15]. Various communicative efforts are underway to enhance citizen participation in the policymaking process and to provide more information about the policy to external stakeholders to relieve the public's concerns and to increase the acceptance of the existing nuclear policy [58]. These key characteristics contribute to making South Korea a relevant context in which to study the structural relationship between government communication and citizen perceptions. Accordingly, this present study on the effectiveness of symmetrical and transparent communication provides helpful lessons for governments in other contexts that are considering the strategic application of symmetrical and transparent communication to improve citizens' perceptions of government.

3.2. Participants

The participants took part in the Citizens' Science School of Nuclear Energy in the spring of 2016. The program engaged nonspecialist audiences in nuclear energy subjects, facilitating public discourse and informal learning about the content [59]. It built upon participatory, deliberative, and collaborative principles offered by large, public universities in Seoul, South Korea, since 2015. Participants voluntarily took part in one-hour sessions, during which, experts (e.g., scientists, philosophers, policymakers, civic representatives) discussed the public issues of nuclear energy and introduced participants to opportunities and challenges, promoting the two-way flow of information and symmetrical interaction [60]. Thus, participants could have open discussions about the issues and values of nuclear energy, and experts could consider the perspectives of less knowledgeable publics when planning and implementing nuclear energy research and policy.

From a pool of 400 participants, 300 completed surveys, giving a 75% participation rate. The surveys explored citizen knowledge and socially desirable response items before an open discussion. After the discussion, participants completed a questionnaire related to the effectiveness of government communications, such as symmetrical communication,

transparent communication, government–citizen relationships, institutional legitimacy, and policy acceptance. The participants ranged in age from 29–42, with a mean age of 36.94 years, and 51% were male. Regarding their educational background, 72% had a bachelor's degree and 31.5% had a master's or doctoral degree.

3.3. Measures

We made rigorous modifications to an existing scale to make it more relevant to government communication in South Korea. To ensure the reliability and validity of the scale, several professional researchers repeatedly pilot-tested and carefully revised the constructs. Responses to all questionnaire items followed a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). Age, gender, and education became control variables in the subsequent analysis.

Citizens' Knowledge—Objective knowledge is accurate, data-driven knowledge about a certain object, and those who use it are more likely to process information analytically, whereas subjective knowledge is self-assessed or perceived knowledge about a certain object [61]. These two types of knowledge are distinct constructs with different measures. Recently, there has been growing interest in subjective knowledge since measuring objective knowledge can be difficult [62]. Following other researchers' practices [63–65], we measured only subjective knowledge on nuclear energy using four modified items: (a) I know about South Korea's nuclear energy policies and regulations, (b) I know the mechanics of nuclear electric power generation, (c) I know the effects of nuclear radiation on human health, and (d) I know details of previous nuclear accidents.

We separated the 300 respondents into two groups (high knowledge vs. low knowledge), based on the mean score (M = 2.99) of each participant's knowledge about nuclear energy, e.g., [66,67]. A total of 189 participants went into the low-knowledge group (M < 2.99); the rest (N = 111) went into the high-knowledge group (M > 2.99). None of the participants had the exact mean score of 2.99.

Importantly, citizen knowledge was assessed before taking part in the program, along with social desirability tendency given that skewed impressions and self-deceptions caused by their program participation might influence responses about the effectiveness of government communication [68]. To this end, a short Korean version of the Marlowe and Crowne social desirability measure [69] was administered to reduce response fatigue and ensure validity before proceeding into the main stage of the survey.

Symmetrical Communication (SC)—We adapted four items from previous research [29,33]: (a) most communication regarding nuclear energy between government officers and residents is two way, (b) the aim of the communication regarding nuclear energy between government officers and residents is to help government organizations to be responsive to the problems faced by residents, (c) I am usually informed about major changes that affect the nuclear energy policies and regulations before they take place, and (d) I am comfortable talking to government officers when nuclear energy policies and regulations are going wrong.

Transparent Communication (TC)—We constructed a four-item instrument that assessed three dimensions of transparent communication: substantial information, participation, and accountability, based on prior studies [13,14]. We used the following items: (a) the government organization wants to understand how its decisions on nuclear energy affect people like me, (b) the government organization provides policy information that is useful to people like me for making informed decisions about nuclear energy, (c) the government organization wants to be accountable to people like me for its operation of nuclear energy plants, and (d) the government organization wants people like me to know how it has designed the nuclear energy policies and regulations and why it is implementing them.

Government–Citizen Relationship (GCR)—Based on a widely adapted instrument of the extant literature [12,30], we developed six items to evaluate the quality of the relationship between the government organization and citizens: (a) the government organization seems to invest in its residents, (b) the government organization demonstrates an interest

in me as a person, (c) the government organization supports events that are of interest to its citizens, (d) the government organization strives to improve the community for its residents, (e) the government organization is honest in its dealings with residents, and (f) the government organization is willing to devote resources to maintaining its relationship with citizens.

Institutional Legitimacy (IL)—Following previous research [8], we used the following three items: (a) I have great respect for the work of the government organization in charge of nuclear energy policies and regulations, (b) I trust the government organization that is accountable for nuclear energy policies and regulations, and (c) I would follow government officers' orders regarding nuclear energy policies and regulations, even if I disagreed with them.

Policy Acceptance (PA)—We adapted four items from prior studies [63–65]: (a) South Korea needs a lot of electricity, people should therefore accept nuclear energy; (b) South Korea can renounce nuclear energy without any problems (we reverse-coded this item); (c) we need increased use of nuclear energy among a number of proposed policy options to deal with issues associated with the Korean energy supply; (d) the continual use of nuclear energy will cause a waste problem (we reverse-coded this item).

3.4. Data Analyses

We analyzed the data using exploratory factor analysis (EFA) in SPSS 20 and confirmatory factor analysis (CFA) via structural equation modeling (SEM) using AMOS 18. We applied EFA to obtain a more manageable scale containing items that were unlikely to vary between samples, ensuring that the factor structure was appropriate. We then applied SEM to ensure adequate construct validity in the data and to verify the level of measurement invariance in more detail. SEM can be appropriate to validate the scales and evaluate the effect of an independent variable if purposive sampling fits the profile of the people that the researcher needed to reach and they are theoretically or qualitatively representative of the greater population [70,71].

We performed EFA tests with a varimax rotation for validity for the construct items of the variables, reliability with Cronbach's α for each component, and CFA. Table 1 shows that the values for all variables for the Kaiser's measure of sampling adequacy (MSA) were acceptable, as the overall Kaiser–Meyer–Olkin (KMO) value was good at 0.97, and Bartlett's test of sphericity was satisfactory ($\chi^2 = 4659.7$, $p < 0.01$) [60].

Table 1. Sample description.

		Total **(N = 300)**	**Low Knowledge** **(N = 189)**	**High Knowledge** **(N = 111)**
Age (years)	M (SD)	36.94 (5.39), range: 29–42	35.85 (4.56), range: 29–40	38.8 (6.15), range: 30–42
Gender	Male	153 (51%)	100 (52.9%)	53 (47.7%)
	Female	147 (49%)	89 (47.1%)	58 (52.3%)
Education	Below high school	19 (6.3%)	12 (6.3%)	7 (6.3%)
	College-graduated	216 (72%)	136 (72%)	80 (72.1%)
	Above college education	65 (21.7%)	41 (21.6%)	24 (21.6%)

We next assessed the discriminant validity and reliability to establish the adequacy of the measurement model. We used composite reliability (CR) and average variance extracted (AVE) to estimate the reliability and convergent validity of the factors [66]. The CR value should be greater than 0.6, and the AVE should be greater than 0.5 [72]. As Table 1 shows, the AVEs were all above 0.7, and the CRs were all above 0.8. Therefore, all factors had adequate reliability and convergent validity. The results of the EFA, the reliability tests with Cronbach's α, and the CFA are in Table 2.

Table 2. Exploratory factor analysis (EFA), Cronbach's α, and confirmatory factor analysis (CFA) results of the variables.

Construct of Variables	Items	M	SD	EFA Component	α	CFA β	SE	CR	AVE
Symmetrical Communication (SC)	SC1	4.19	1.55	0.91		0.79	0.23		
	SC2	3.72	1.78	0.82	0.88	0.84	0.15	0.85	0.75
	SC3	3.95	1.61	0.84		0.8	0.19		
	SC4	3.78	1.76	0.75		0.71	0.28		
Transparent Communication (TC)	TC1	3.7	1.76	0.89		0.78	0.1		
	TC2	3.77	1.71	0.86	0.91	0.87	0.23	0.89	0.72
	TC3	3.65	1.6	0.75		0.79	0.27		
	TC4	3.68	1.63	0.69		0.74	0.16		
Government–Citizen Relationship (GCR)	GCR1	3.69	1.7	0.91		0.83	0.2		
	GCR2	3.81	1.67	0.91		0.87	0.11		
	GCR3	3.81	1.6	0.92	0.87	0.82	0.25	0.93	0.75
	GCR4	3.72	1.69	0.76		0.81	0.21		
	GCR5	3.75	1.66	0.79		0.72	0.1		
	GCR6	3.78	1.66	0.84		0.75	0.28		
Institutional Legitimacy (IL)	IL1	3.72	1.7	0.81		0.81	0.13		
	IL2	3.97	1.53	0.89	0.88	0.77	0.22	0.91	0.73
	IL3	3.89	1.64	0.88		0.75	0.23		
Policy Acceptance (PA)	PA1	3.8	1.71	0.70		0.82	0.23		
	PA2	3.81	1.67	0.90	0.92	0.87	0.1	0.89	0.85
	PA3	3.82	1.72	0.94		0.83	0.12		
	PA4	3.81	1.58	0.94		0.8	0.09		

Note—Goodness of fit index (GFI): χ^2 = 282.32, df = 147, χ^2/df = 1.92, root mean square error of approximation (RMSEA) = 0.05, comparative fit index (CFI) = 0.98. CR: composite reliability, AVE: average variance extracted.

We performed correlations to establish discriminant validity for the two sample groups. Table 3 shows correlations (r) and coefficient determinations (r^2) for the low- and high-knowledge groups.

Table 3. Correlations (r) and coefficient determinations (r^2).

Variables	AVE	Low-Knowledge Group 1	2	3	4	High-Knowledge Group 1	2	3	4
1. SC	0.75	-				-			
2. TC	0.72	0.42 (0.18) **	-			0.90 (0.81) **	-		
3. GCR	0.75	0.27 (0.07) **	0.28 (0.08) **	-		0.90 (0.81) **	0.88 (0.77) **	-	
4. IL	0.73	0.14 (0.02)	0.05 (0.003)	0.14 (0.02)	-	0.81 (0.66) **	0.80 (0.64) **	0.83 (0.69) **	-
5. PA	0.85	0.33 (0.11) **	0.08 (0.006)	0.20 (0.04) **	0.19 (0.04) *	0.84 (0.71) **	0.81 (0.66) **	0.87 (0.76) **	0.89 (0.79) **

* $p < 0.05$, ** $p < 0.01$.

Additionally, to examine the multicollinearity within the high-knowledge group, we calculated the variance inflation factor (VIF) and the tolerance. They were satisfactory (VIF = 5.1, tolerance = 0.22) [67]. Overall, the total AVEs of both groups were larger than their correlation values and coefficient determinations (r^2); therefore, discriminant validity applied to both groups.

4. Results

4.1. Preliminary Analysis

Before the analyses, we performed several preliminary tests. We ran independent t-tests to find any differences between the groups. As Table 3 shows, the high-knowledge group had higher means for all variables than the low-knowledge group. In addition, the mean differences were all statistically significant. Table 4 shows each group's mean and standard deviation scores, as well as the t scores for each variable.

Table 4. Results of the *t*-tests.

Variables	Knowledge	*M*	SD	*t* (df), *p*
SC	Low (*N* = 189) High (*N* = 111)	3.14 5.17	0.53 1.14	20.94 (298), **
TC	Low (*N* = 189) High (*N* = 111)	2.92 5.09	0.4 1.11	24.35 (298), **
GCR	Low (*N* = 189) High (*N* = 111)	2.94 5.17	0.36 1.12	25.19 (298), **
IL	Low (*N* = 189) High (*N* = 111)	3.07 5.22	0.64 1.25	19.71 (298), **
PA	Low (*N* = 189) High (*N* = 111)	3.03 5.23	0.52 1.24	21.49 (298), **

** $p < 0.01$.

4.2. Invariance Tests

As the samples were based on two groups (high- vs. low-knowledge groups) with distinct differences, we first needed to verify assumptions regarding measurement invariance, specifically configural, metric, and scalar invariance [72,73]. Thus, we ensured that the configuration of factors was the same in both groups (configural invariance), they were interpreting the rating scales similarly (metric invariance), and the scales meant the same thing to participants from both groups (scalar invariance) [72,73].

Table 4 indicates that there was configural invariance when the basic model structure was invariant across the two groups [66]. This initial baseline had no between-group invariance constraints; therefore, differences might still exist in factor loadings, intercepts, and variances, but it provided a basis for comparison as we added such constraints ($\chi^2(165) = 281.16$, $p < 0.01$, Tucker–Lewis index (TLI) = 0.92, comparative fit index (CFI) = 0.92, root mean square error of approximation (RMSEA) = 0.052).

Since the constrained model was nested within the model that tested for configural invariance, we examined the results of a χ^2 difference test [66]. A model that achieved metric invariance would have both a good fit to the data and a nonsignificant difference relative to the previous model. However, while the use of χ^2 is widespread, previous researchers have suggested that other fit indices, such as the CFI, are also useful to evaluate a model's fit where there may be a significant difference [67,72]. As Table 4 shows, the insignificant χ^2 difference ($\Delta\chi^2(18) = 4.02$, $p > 0.5$) and CFI difference (ΔCFI = 0.03) indicated that metric invariance applied.

Meanwhile, the significant χ^2 difference ($\Delta\chi^2(78) = 226.27$, $p < 0.01$) and CFI difference (ΔCFI = −0.04) indicated that full scalar invariance did not apply. However, some items, such as TLI and RMSEA (ΔTLI = −0.2, ΔRMSEA = 0.04), on each factor were scalar invariant, suggesting that there was partial scalar invariance [73]. The results of the invariance tests are given in Table 5.

Table 5. Results of the invariance tests.

Invariance Index	χ^2	df	χ^2/df	TLI	CFI	RMSEA
Configural Invariance	281.16	165	1.7	0.92	0.92	0.052
Metric Invariance	285.18	183	1.56	0.94	0.95	0.054
Scalar Invariance	511.45	261	1.96	0.92	0.91	0.058

4.3. Main Analyses

Before the final analyses, we calculated multiple fit indices to assess the model fits for the two knowledge groups. As Table 6 shows, the model fits were good [66,67,72].

Table 6. Multiple fit indices to assess the two model fits.

Goodness of Fit	Absolute Fit Index			Incremental Fit Index		
	χ^2 (df)	RMSEA	GFI	NFI	TLI	CFI
Fit Standards	$p < 0.05$	< 0.08	> 0.9	> 0.9	> 0.9	> 0.9
Low-Knowledge Group	246(147), $p < 0.01$	0.059	0.89	0.87	0.88	0.89
High-Knowledge Group	405.1(147), $p < 0.01$	0.055	0.92	0.86	0.89	0.9

NFI: normed fit index, TLI: Tucker–Lewis index.

For the low-knowledge group, as Table 7 shows, the results of the main analysis supported all the expected paths. First, the direct effect of symmetrical communication on the perceived quality of relationships when controlling for transparent communication in the mediation path was significant but smaller ($\beta = 0.2$, $p < 0.01$) than the effect of symmetrical communication on the quality of relationships without controlling for transparent communication ($\beta = 0.28$, $p < 0.01$). This finding provided evidence for partial mediation in this model. Following Baron and Kenny's steps [74], we obtained a Sobel z-score for statistical decisions regarding the overall indirect effects of the mediation model. It confirmed that transparent communication significantly mediated the effects of symmetrical communication on the perceived quality of relationships ($z = 2.3$, $p < 0.05$). The results also revealed that symmetrical communication significantly influenced transparent communication ($\beta = 0.42$, $p < 0.01$) and transparent communication positively influenced the perceived quality of relationships ($\beta = 0.18$, $p < 0.05$).

Table 7. Results of the path analyses of the two groups.

Paths	Low Knowledge				High Knowledge			
	B	SE	CR	β	B	SE	CR	β
SC→TC	0.32	0.05	6.34	0.42 **	0.88	0.04	21.72	0.90 **
TC→GCR	0.17	0.069	2.40	0.18 *	0.59	0.09	6.63	0.59 **
SC→GCR [1]	0.19	0.05	3.92	0.28 **	0.86	0.05	19.09	0.88 **
SC→GCR [2]	0.14	0.05	2.60	0.20 **	0.34	0.09	3.85	0.34 **
GCR→IL	0.25	0.13	1.94	0.14 *	0.92	0.06	15.42	0.83 **
IL→PA	0.18	0.06	1.38	0.11 *	0.55	0.07	8.42	0.55 **
GCR→PA [3]	0.29	0.10	2.78	0.20 *	0.96	0.053	18.28	0.87 **
GCR→PA [4]	0.27	0.10	2.57	0.18 **	0.45	0.073	6.20	0.41 **

* $p < 0.05$, ** $p < 0.01$. Note: (1) direct effect of SC on GCR without controlling for TC, (2) direct effect of SC on GCR when controlling for TC in the mediation path, (3) direct effect of GCR on PA without controlling for IL, and (4) direct effect of GCR on PA when controlling for IL in the mediation path.

Furthermore, the direct effect of the perceived quality of relationships on policy acceptance when controlling for institutional legitimacy in the mediation path was significant but smaller ($\beta = 0.18$, $p < 0.05$) than the effect of the quality of relationships on policy acceptance without controlling for institutional legitimacy ($\beta = 0.2$, $p < 0.01$). Consequently, this finding provided evidence for partial mediation in this model. A Sobel z-score confirmed that institutional legitimacy significantly mediated the effects of the perceived quality of relationships on policy acceptance ($z = 2.1$, $p < 0.05$). The results also indicated that the perceived quality of relationships significantly influenced institutional legitimacy ($\beta = 0.14$, $p < 0.05$) and institutional legitimacy positively influenced policy acceptance ($\beta = 0.11$, $p < 0.05$).

For the high-knowledge group, the results of the main analysis fulfilled our expectations (see Table 7). First, the direct effect of symmetrical communication on the perceived quality of relationships when controlling for transparent communication in the mediation path was significant but smaller ($\beta = 0.34$, $p < 0.01$) than the effect of symmetrical communication on the quality of relationships without controlling for transparent com-

munication ($\beta = 0.88$, $p < 0.01$). Consequently, the finding provided evidence for partial mediation in this model. A Sobel z-score confirmed that transparent communication significantly mediated the effects of symmetrical communication on the perceived quality of relationships ($z = 6.36$, $p < 0.01$). The results also clearly indicated that symmetrical communication significantly influenced transparent communication ($\beta = 0.9$, $p < 0.01$) and transparent communication positively influenced the perceived quality of relationships ($\beta = 0.59$, $p < 0.05$).

Furthermore, the direct effect of the perceived quality of relationships on policy acceptance when controlling for institutional legitimacy in the mediation path was significant but smaller ($\beta = 0.41$, $p < 0.01$) than the effect of the quality of relationships on policy acceptance without controlling for institutional legitimacy ($\beta = 0.87$, $p < 0.01$). Consequently, the finding provided evidence for partial mediation in this model. A Sobel z-score confirmed that institutional legitimacy significantly mediated the effects of the perceived quality of relationships on policy acceptance ($z = 7.4$, $p < 0.01$). The results also showed that the perceived quality of relationships significantly influenced institutional legitimacy ($\beta = 0.83$, $p < 0.01$) and institutional legitimacy positively influenced policy acceptance ($\beta = 0.55$, $p < 0.01$).

Finally, we tested for cross-group equality constraints. As Table 8 shows, except for the path indicating "government–citizen relationship→policy acceptance," all paths significantly varied depending upon the level of knowledge. Low-knowledge respondents did not process government communication, establish relationships with the government, or display perceptual and attitudinal responses in the same way as their high-knowledge counterparts. The results of the path analyses and the Sobel test indicated that our research hypotheses were confirmed.

Table 8. Cross-group equality constraints of the path analyses between the high- and low-knowledge groups.

Path Invariance	Δdf	$\Delta\chi^2$
SC→GCR	1	3.91 **
SC→TC	1	68.2 **
TC→GCR	1	14.1 *
GCR→PA	1	2.22
GCR→IL	1	22.72 **
IL→PA	1	26.82 **
All constrained	6	193.21 **

* $p < 0.05$, ** $p < 0.01$.

5. Conclusions and Discussion

5.1. Discussion

The aim of this study was to answer the following research question: How does citizens' knowledge affect the process of government communication effectiveness? Based on the relationship management perspective and the ELM, the information this article presents advances the notion that the government–citizen relationship mediates the positive associations between government communicative efforts and citizen attitudes toward public policy. Furthermore, the interrelationship of government communication approaches and corresponding outcomes is stronger for citizens who have higher levels of knowledge than for their counterparts. These findings open up a myriad of potential applications of government communication, as well as specific theoretical implications.

First, the key point emerging from this study is that the degree of government communication effectiveness might differ significantly with citizen perceptions, attitudes, and knowledge. From the findings, it appears that government communicative initiatives that develop and exploit a sense of symmetry and transparency among constituencies have close relationships with the enhancement of the government–citizen relationship. Consistent with prior studies, e.g., [12,13,22], this study supports the contention that government

organizations benefit from the relationship quality enabled by communication policies and practices involving symmetry and transparency. Furthermore, the results regarding the mediating role of transparent communication suggest that constituencies experiencing or practicing symmetrical communication are more likely to engage in transparent communication processes that can turn candid, participatory, substantial, and timely government information into reality and impact the lives of the citizens.

A common mistake of government organizations is manipulating or attempting to control the thoughts and behavior of citizens engaged in decision-making and management processes rather than coproducing meaning and solutions for certain public issues and policy agendas [34]. Many researchers have pointed out the limited application of communication methods and techniques to engage stakeholders in exploring situations, sharing information, creating meaning and value, and enhancing co-orientation and cooperation that can benefit from government initiatives and make them more effective [24,75]. Based on the preceding discussion, along with findings in this study, we argue that government organizations with a symmetrical worldview are more willing to perform communication activities that can help citizens to construct cognitions and attitudes that are aligned and adjusted to government intentions and initiatives and can fill the gaps in perceptions and knowledge for sense-making and problem-solving between the government and citizens. In this vein, the authors suggest that symmetrical and transparent communication is helping to lead toward relationship cultivation for good governance between governments and citizens by enabling constituencies and stakeholders to deploy the provision and transmission of government information properly—directed toward strong normative and ethical purposes—to deliver improvements in the policy process and even for social capital building in policy communities and beyond [6,17].

Moreover, it is worth noting that institutional legitimacy mediates the association between government–citizen relationships and policy acceptance. Extending the findings of previous studies [33,36,37,39], the findings of this study suggest that shaping favorable relationships between the government and citizens can generate positive citizen perceptions of a government organization in terms of institutional legitimacy, which in turn, may transfer into the formation of better attitudes toward public policy created by the organization. Considering that legitimacy is an operational resource for the functioning of organizations [36], it is necessary to pay special attention to the strategic management approach to build and improve government legitimacy among constituencies.

5.2. Practical Implications and Limitations

The current research found that citizens' knowledge dimension about a policy issue or government affair can play a pivotal role in effectuating their perceptual, cognitive, and motivational elaborations of forming and improving relational, institutional, and behavioral perspectives on policy and government decisions. Even though findings in prior studies revealed that citizens' knowledge might mitigate or offset the effect of government communication and information in attitude formation [6,11], these results empirically substantiate the possibility that a greater level of knowledge about a target policy issue and agenda can act as a catalyst for inducing deliberate reasoning and cognitive elaboration rather than intuitive and spontaneous processing when making a judgment in the public sphere. Therefore, the authors consider citizens' conscious and knowledgeable deliberation about the policy as key drivers of formulating a systematic opinion and, in turn, incorporating informed and enlightened citizenry into public governance. In terms of practical implications, the Korean government needs to communicate with people to increase public knowledge regarding nuclear energy. At the same time, it seems to be necessary for the government to symmetrically and transparently inform people of the current domestic energy situation.

The findings further indicated that even though average citizens use different information-processing strategies in the process of making decisions, more knowledgeable citizens engaged in the symmetrical and transparent government communication process

are more likely to rely on systematic, deliberate (vs. heuristic) processing, i.e., take the central, elaborated (vs. peripheral) route, toward making an effective judgment as a crucial part of reaching a valid decision. According to the bounded rationality perspective [76], a number of average citizens act as cognitive misers, who suffer from the lack of cognitive ability and resources, information overload, and limited available time, and as a result, opt to use suboptimal decision strategies for making decisions or forming attitudes concerning a policy object without a thorough information search or deliberation. Indeed, there are many cases in which individuals use oversimplified choice options, engage in minimal information searches, arrive at erroneous judgments, and make ill-informed decisions due to the lack of information and knowledge necessary for rational human decision-making [77]. In this regard, the findings appear to suggest that government communication initiatives that are framed and executed as transparent, symmetrical, and even relational should go to an informed, enlightened citizenry to form the collective elaborations and social representations linked to lay citizens' support for a policy [27,30]. In a nutshell, a stronger commitment to cultivating informed citizenship about a policy agenda addressed as government communication will ensure an increase in the public impacts and values of government communication initiatives [34,75].

Of equal interest are the implications concerning the positive role of citizens' knowledge in increasing the likelihood of government policy acceptance. Consistent with previous literature [10,51], the authors found that more informed and knowledgeable citizens are capable of engaging with government communication programs as a certain venue of information processing and decision-making, thereby resulting in better attitudes toward government and its policy in terms of perceived legitimacy and policy acceptance. In this view, the foundation of government communication should center on developing communication strategies that are more resonant with the key publics' cognitive capacity, confidence in knowing, and knowledge calibration. Furthermore, governments should make parallel efforts to nourish and empower citizens with more advanced mindsets and cognitive mechanisms for elaborating the policy content and information incorporated in government communication initiatives.

Finally, this study has limitations. First, as this study assessed the outcome and the exposures in the study participants at the same time in 2016, this may be useful before planning a cohort study (participants selected based on the exposure status) or as a baseline in a cohort study in the current situation. However, since our cross-sectional approach was a one-time measurement of exposure and outcome, future research would be well served by employing longitudinal and experimental investigations or case-control studies (participants selected based on the outcome status) to derive causal relationships from the cross-sectional analysis and provide a more complete picture of the extent of policy communication in energy governance and public service. Second, the sample consisted of relatively young and highly educated citizens in South Korea. Even though, in general, empirical research faces a trade-off in light of selecting and adopting a particular methodology [78], it is difficult to generalize the findings to the whole population due to the selection bias resulting from an unrepresentative sample. Nonetheless, it is possible that making use of more homogeneous samples allowed the authors to assess associations and even address causal relationships by controlling for any sources of endogeneity that might exist in the relationships between government communication, relationship quality, and citizens' perceptions and attitudes. Therefore, this research revealed some issues that merit future research in other organizational contexts and outside South Korea to obtain results that are more widely generalizable. Third, this study intended to focus on the institutional level government communication aspects that can affect the government–citizen relationship rather than interpersonal level interaction. Nonetheless, the implications and importance of informal communication for government–citizen interaction should be discussed and addressed for future research on government communication strategies and public performance management in our subsequent study. Lastly, this study used a cross-sectional survey design to investigate the links between government communicative efforts and

citizen attitudes, making it difficult to determine causal relationships. As such, the findings of this study should be interpreted with caution. In this respect, the authors suggest that fruitful avenues for further work include adopting an experimental methodology (or other forms of longitudinal empirical analysis), which is generally better for clarifying causal relationships, to provide a stronger theoretical basis for the extant research.

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