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Exploring the Nexus between Transparency and Citizens' Intention to Participate in Climate Change Policy-Making

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Abstract: This study aims to explore strategies that can propel informed and inclusive citizen engagement in shaping climate policy that addresses the formidable challenge of climate change and shapes a more sustainable future for all. To this end, the researcher endeavored to unpack the complex interplay and mechanisms at play in this relationship through an in-depth investigation into the four mediating factors, efficacy, awareness, concern, and attitude, and four pathways that link transparency to citizen intentions to participate in climate policy-making. The researcher constructed a conceptual model with mediators and serial multi-mediators that incorporates relationships between variables based on research hypotheses. To test these research hypotheses and estimate the conceptual model, structural equation modeling (SEM) and phantom models representing specific indirect effects of the covariance structure model were applied, .using AMOS Ver. 26.0. The sample consisted of 500 adults selected through a proportionate stratified sample design. Research findings confirmed that the overall fit of this research model was deemed appropriate, and the direct effect and indirect effect of transparency on citizens' intention to participate in climate change policy-making is confirmed. Based on model fit, the researcher proposed a Transparency–Engagement Nexus Model that shows the relationship between transparency and citizens' intention to participate in climate change policy-making. The theoretical and practical implications of these research findings were addressed, and future research directions were also suggested.

Keywords: transparency; climate change policy-making; participation intention; Transparency–Engagement Nexus Model

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1. Introduction

In the face of unprecedented climate change and its far-reaching consequences, the imperative to address climate change through effective policy-making has never been more pressing [1,2]. Climate change policy-making, with its intricate web of environmental, economic, and social considerations, requires the engagement of diverse stakeholders, including governments, organizations, and international bodies. However, the success of climate change policies is intricately linked to the degree of citizen involvement and engagement in the decision-making process. In other words, it has become increasingly evident that their success hinges on the meaningful involvement of the very individuals who will be most affected by their implementation—ordinary citizens [3–9].

One critical aspect of citizen participation in climate policy-making is the role played by information transparency [10–15]. This recognition forms the bedrock of Principle 10 of the Rio Declaration on Environment and Development, which underscores the imperative of involving the public in environmental decision-making processes, emphasizing transparency, accountability, and citizen participation as central tenets in crafting effective climate change policy [16]. Information transparency entails providing citizens with clear, accessible, and comprehensive information about climate change, proposed policies, and their potential consequences.

The principle of citizen participation is widely recognized as a cornerstone of democratic governance [5–8], and this remains true in the context of climate policy-making. Empowering citizens to actively participate in making climate policies not only aligns with democratic values but also enhances the legitimacy, effectiveness, and inclusivity of such policies [15,17,18]. Based on this significance, it has been proposed that the degree of transparency in disseminating information related to climate change policy plays a pivotal role in determining the extent to which citizens engage with these policies [14,15]. The underlying premise is that when individuals have access to clear, comprehensive, and understandable information about policies, they are more inclined to engage actively in the decision-making process.

Contrary to perceptions of the importance of information transparency as a catalyst for citizen engagement [10–15], there is a notable scarcity of empirical research that examines a pivotal relationship between information transparency and citizens' intentions to participate in policy-making in the context of climate change. Beyond this, the researcher recognizes the potential for mediation in this relationship—factors such as cognition, efficacy, and attitudes toward policy-making participation are likely to play mediating roles in the relationship between information transparency and citizens' intentions to participate in climate change policy-making, drawing from established theoretical frameworks including the theory of planned behavior (TPB) and expectancy–value theory [19–24].

However, prior research has largely examined these variables in isolation, and there exists a notable research void concerning their collective mediation potential, and a critical void exists in our understanding of the precise mechanisms that underlie this intricate relationship. As a result, the multifaceted and complex relationship between information transparency and citizen intentions to participate in policy-making has remained largely uncharted territory in academic research.

Therefore, despite the critical role of information transparency in fostering citizen engagement, there remains a notable research gap in understanding the specific mechanisms underpinning the relationship between information transparency and citizen intentions to participate in policy-making. There is a need for deep research to elucidate the intricacies of this relationship.

To meet the pressing need to close this knowledge gap, this study embarks on a profound exploration of the multifaceted relationship between information transparency and citizen participation within the context of climate change policy. Therefore, the overarching goal of this research is to unravel the complex relationship between information transparency and citizen intentions to participate in climate policy-making, providing a deeper understanding of this connection.

To achieve this objective, this researcher endeavored to reveal the complex interplay and mechanisms at play in this relationship through an in-depth investigation into the mediating factors and pathways that link transparency to citizen intentions to participate in climate policy-making.

Furthermore, this researcher constructed a model that integrates the relationships between variables, which provides a structural understanding of the relationship between transparency and citizen intentions to participate in policy-making. This model is envisioned to serve as a practical tool for policymakers, researchers, and civil society organizations, offering a structured framework to understand and enhance citizen engagement in climate policy-making.

In essence, by empirically unraveling the mechanisms at play and proposing a conceptual model, this research aims to provide valuable insights that can propel informed and inclusive citizen engagement in shaping climate policy, thereby advancing our efforts to address the formidable challenge of climate change and shaping a more sustainable future for all.

The research purpose is described in detail as follows.

The first purpose of this study is to empirically verify whether transparency in the context of climate change has a significant impact on citizens' intention to participate in policy formulation.

The second research purpose seeks to examine and verify the mechanisms and mediating effects underlying the relationship between information transparency and citizen participation intentions in climate policy-making. This verification will provide empirical evidence that illuminates the nuanced pathways through which information transparency impacts citizen engagement, contributing to a deeper understanding of this critical relationship.

The third research purpose is to construct a comprehensive model that integrates the relationships between variables involved in the context of information transparency and citizen participation intentions in climate policy-making. This model will serve as a valuable tool for policymakers and researchers offering a meaningful direction for enhancing information transparency and fostering more inclusive and effective climate policies.

Based on the research purpose and research background, this study formulated the following research questions.

RQ1: Does transparency affect citizens' intentions to participate in climate policy-making?

RQ2: What are the underlying mechanisms through which transparency affects citizens' intentions to participate in climate policy-making?

RQ3: To what extent does the proposed comprehensive model accurately fit the observed data, representing the complex interplay between variables related to transparency and citizens' intentions to participate in climate policy-making?

2. Literature Review and Conceptual Framework

The second section discusses the theoretical framework that provides support for the study, with a focus on the intention to participate in climate change policy. The researcher referred to theories that would promote an understanding of the intention to participate in climate change policy-making. There are several theories that can help explain the relationship between transparency and intention to participate in policy-making.

2.1. The Expectancy–Value Theory

To begin with, the researcher referred to the expectancy–value theory, which is primarily a psychological framework used to understand how individuals make decisions and engage in behaviors, to unpack the multifaceted relationship between information transparency and intention to participate in climate change policy-making. It focuses on the idea that people are more likely to engage in activities or behaviors when they expect that their efforts will lead to a desired outcome, and when they value or are motivated by that outcome. Expectancy–value theorists, including Eccles and Wigfield, propose that individuals' choices, persistence, and performance can be understood by examining their beliefs regarding their expected success in the activity and the degree to which they value the activity [21,22].

While it is not a direct model for explaining citizens' participation in policy-making, it can be applied to analyze some of the factors influencing citizens' intentions to participate in policy-making, such as those related to climate change. The author broke down the components of the expectancy–value theory, which are expectancy and value [21], and related them to information transparency and its impact on citizens' intentions to participate in climate change policy-making. Here is how it works.

Expectancy refers to an individual's belief about the likelihood of achieving a desired outcome, which is related to beliefs such as self-concept and self-efficacy [21,22]. When applying such a conceptual definition to the context of climate change policy participation, citizens' expectancy can be related to their beliefs about the effectiveness of their participation in influencing policy decisions. A crucial factor in citizens' expectancies is the transparency related to climate change policies [15]. Transparency impacts citizens' intentions to participate in policy-making regarding climate change. When citizens perceive that

they have access to clear, trustworthy, and up-to-date information about climate change and relevant policies, it positively influences their intentions to participate. Transparent policy processes can motivate citizens to participate more actively in politics. When government and relevant institutions provide clear and accessible information about their policies and their potential impacts, it enhances citizens' expectations of making a meaningful contribution. When citizens believe their involvement can influence policy outcomes, they are more likely to engage in activities like voting, attending public hearings, and advocating for specific policy changes [25–34].

Transparency in policy processes can boost citizens' perception of their ability to influence political outcomes, which is political efficacy. When individuals have access to information about how decisions are made, including the role of public input, it increases their confidence that their voices can make a difference. This in turn increases their confidence in participating in political processes. This contributes to a higher sense of political efficacy. When citizens see that decisions are made with transparency and fairness, they are more likely to have confidence in the political system. This trust can lead to a higher sense of efficacy, as citizens believe that their input will be taken seriously and that policies will reflect their concerns. When citizens have access to information about policy decisions, they can scrutinize the rationale behind those decisions. This accountability encourages policy-makers to consider public preferences and concerns, increasing the perceived efficacy of citizen engagement. If citizens believe that their government is receptive to their input and that policies can make a difference, they are more likely to value their participation [25–34].

To sum up, transparency may influence citizens' intention to participate in climate policy-making processes (H1) and may affect political efficacy, with transparent access to information fostering a sense of political empowerment among citizens (H2). This, in turn, increases citizens' intention to participate in climate change policy-making (H3). Also, there is a possibility that political efficacy mediates the relationship between transparency and citizens' intention to participate in climate policy-making processes.

Value, in this context, refers to the perceived significance or importance that individuals associate with the outcomes linked to their actions [21,22]. According to Eccles and her colleagues, subjective task values are defined as the motivations that lead individuals to engage in various tasks. Attainment value (importance), intrinsic value (interest), and utility value (usefulness) are fundamental components of subjective task values [21].

When applying this conceptual definition of value in the context of climate change policy-making, it can be understood through aspects such as the importance and usefulness that citizens attribute to participating in climate change policy-making, as well as their interest. The perceived importance and usefulness of participating in climate change policy-making can lead to an intention to engage in such activities. Moreover, citizens with a profound concern for the impact of climate change are likely to demonstrate an increased intention to participate in climate change policy-making. However, it's essential to note that the utility and interest in climate change policy and a profound concern for the impact of climate change should not be considered in isolation but should be based on a foundation of a high level of awareness about climate change and its consequences. Hence, if citizens have a good understanding of the seriousness and immediacy of climate change problems, they tend to place greater importance on their engagement in policy-making as a way to tackle these issues. Previous studies [26,28,29,34] suggest that well-informed citizens are more likely to value their participation in policy-making as a means to address the severity and urgency of climate change issues.

Therefore, transparency may enhance citizens' climate change awareness (H4), leading to not only a deeper concern of climate issues among citizens (H5) but also a positive attitude toward participation in climate change policy-making (H6). Furthermore, there is a possibility that a positive attitude toward participation in climate change policy-making and concern for the impact of climate change have effects on citizens' intention to participate in policy-making in the context of climate change (H7, H8).

Additionally, when paying attention to the relationships between the variables described above, the following possibilities can also be derived.

There is a possibility that political efficacy mediates the relationship between transparency and citizens' intention to participate in climate policy-making processes (H9). Also, there is a possibility that climate change awareness and concern about climate change mediate the relationship between transparency and citizens' intention to participate in climate policy-making processes in serial (H10). Additionally, there is a possibility that climate change awareness and attitude toward participating in policy-making processes dealing with climate change mediate the relationship between transparency and citizens' intention to participate in climate policy-making processes in serial (H11).

2.2. The Theory of Planned Behavior (TPB)

In the context of climate change, the relationships between awareness, concern, attitude, efficacy, and intention to participate can also be approached in part through the theory of planned behavior (TPB). This theory is a well-established psychological theory that explains human behavior, including intentions to engage in specific actions. It posits that intentions are influenced by three key factors, attitude, subjective norms, and perceived behavioral control [23]. In the context of climate change policy-making, the theory of planned behavior can explain the following.

Perceived behavioral control (PBC) is defined as an individual's perception of their ability to perform the behavior [23]. If citizens believe they have the necessary resources and competencies to participate effectively in the policy-making process, their perceived behavioral control can be higher. Transparency can be said to be an important channel and source through which citizens can access knowledge and information related to climate change [28,30,32]. Knowledge of the connections between climate change, health, and human rights can empower citizens by providing them with a clearer understanding of how their participation can make a difference. This increased perceived behavioral control can boost their intention to participate in policy-making (H3).

Citizens' awareness of climate change may influence their favorable attitude toward their intention to participate (H6). The theory of planned behavior premise implies that this positive attitude can increase their intention to participate in climate change policy-making (H7). When citizens are aware of the severe problems associated with climate change, such as displacement due to extreme weather events, food insecurity, or loss of livelihoods, people seek to devise multifaceted strategies or policies to alleviate and adapt to the problems [35]. At this time, they may perceive participation in climate change policy-making as a way to mitigate these risks, which means that there is a possibility that concern and positive attitude toward participation in climate change policy-making have effects on citizens' intention to participate in policy-making in the context of climate change (H7, H8).

2.3. Conceptual Framework

Taking together the above hypotheses, the researcher constructed a conceptual model, presenting the relationship between transparency and citizens' intention to participate in climate policy-making processes and unraveling the complex interplay of transparency on citizen participation intentions through political efficacy, awareness, concern, and attitude. Figure 1 shows the overall hypothesized conceptual model.

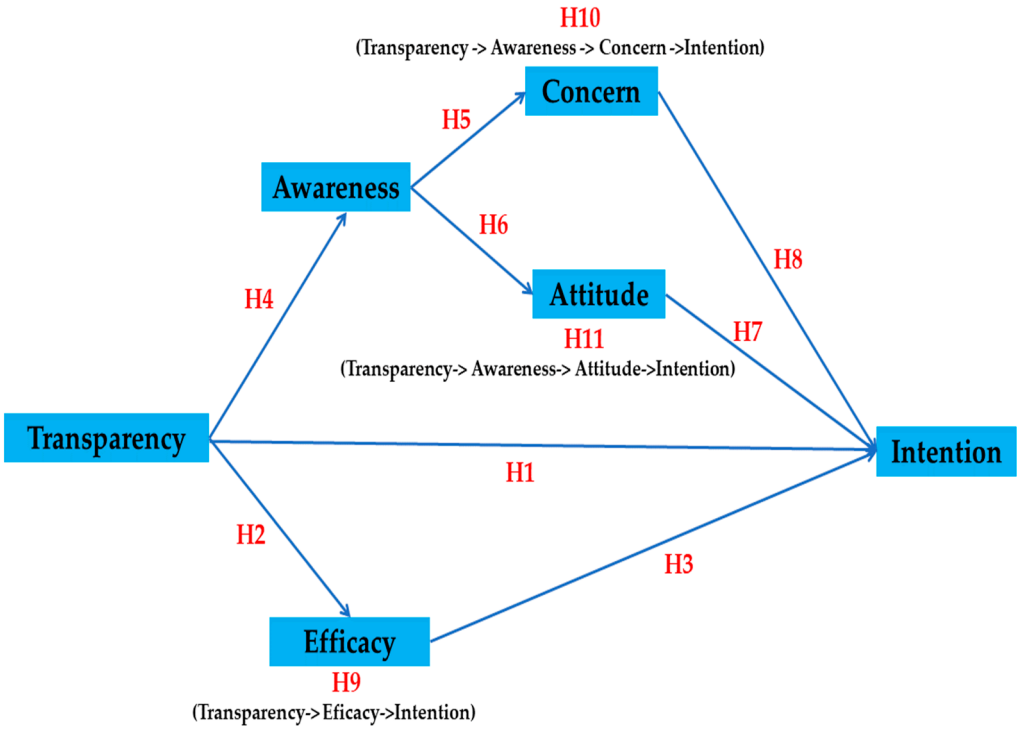


Figure 1. Conceptual model.

3. Research Design

The third section includes the empirical related studies and provides a description of research questions, variables, and hypotheses that were derived from the review of related literature.

3.1. Procedures and Sample

The researcher obtained data from "The 2021 Survey of Citizens' Awareness on Climate Change and Human Rights targeting adults", which was carried out by the non-profit organization DuRu and the law firm JiPyeong, under commission from the National Human Rights Commission of Korea. This survey aimed to understand how Korean citizens perceive climate change and its impact on human rights, a matter of significant interest not only in Korea but also internationally, and further to determine whether human rights are being violated or there is a need to protect human rights. The survey employed a proportionate stratified sampling design, considering population distribution by region, gender, and age [36]. This method takes into account the relative proportions of different strata within the population, enhancing the accuracy and generalizability of survey results when dealing with diverse populations with varying characteristics.

A random stratified sample of 500 adults was selected for the study. In terms of gender distribution, 49.4% were male and 50.6% were female. Regarding age distribution, participants were categorized into their 20s (16.8%), 30s (15.2%), 40s (18.6%), 50s (20.0%), and over-60s (29.4%). When it comes to the standard of living distribution, 1.0% fell into the upper category, 8.4% in the medium-high, 47.8% in the medium, 34.0% in the low-medium, and 8.8% in the low category. In terms of the highest level of education distribution, 0.6% had a middle school education, 19.2% had a high school education, 16.0% had a junior college degree, 55.2% had an undergraduate degree, and 9.0% held a graduate school degree. Regarding job distribution, 1.0% were employed in agriculture/fishing/forestry, 9.0% were self-employed, 5.8% worked in sales and service occupations, 32.6% were office workers, 7.8% were technical workers, 3.2% were civil servants/teachers, 7.2% were professionals, 17.4% were housewives, 12.2% were either unemployed or retired, and 3.8% were students.

The demographic and sociological characteristics of the sample, including gender, age groups, income levels, and regional distribution, are detailed in Table 1.

Table 1. The demographic and sociological characteristics of the sample.

		Frequency	%			Frequency	%
Area of residence	Seoul	97	19.4	Gender	Male	247	49.4
	Busan Metropolis	33	6.6		Female	253	50.6
	Daegu Metropolis	24	4.8	Age	20s	84	16.8
	Incheon Metropolis	29	5.8		30s	76	15.2
	Gwangju Metropolis	12	2.4		40s	93	18.6
	Daejeon Metropolis	12	2.4		50s	100	20.0
	Ulsan Metropolis	10	2.0		over-60s	147	29.4
	Gyeonggi-do	130	26.0	Standard of living	Upper	5	1.0
	Gangwon-do	14	2.8		Medium High	42	8.4
	Chungcheongbuk-do	15	3.0		Medium	239	47.8
	Chungcheongnam-do	20	4.0		Low-Medium	170	34.0
	Sejong	3	0.6		Low	44	8.8
	Jeollabuk-do	17	3.4	Job	Agriculture/Fishing/Forestry	5	1.0
	Jeollanam-do	18	3.6		Self-employed	45	9.0
	Gyeongsangbuk-do	27	5.4		Sales/Service workers	29	5.8
	Gyeongsangnam-do	32	6.4		Office workers	163	32.6
	Jeju-do	7	1.4		Technical worker	39	7.8
Average monthly household income (Unit: ten thousand won)	~ 100	7	1.4		Civil servant/Teacher	16	3.2
	101~200	48	9.6		Professional	36	7.2
	201~300	73	14.6		Housewife	87	17.4
	301~400	82	16.4		Unemployed/Retired	61	12.2
	401~500	82	16.4		Student	19	3.8
	501~600	65	13.0	Highest level of education	Middle school	3	0.6
	601~700	48	9.6		High school	96	19.2
	701~800	25	5.0		Junior college	80	16.0
	801~900	24	4.8		Undergraduate	276	55.2
	901~1000	20	4.0		Graduate school degree	45	9.0
	1001~	26	5.2		N (500)		

3.2. Measurement Instrument

The measurement instrument for "The 2021 Survey of Citizens' Awareness on Climate Change and Human Rights targeting adults" consists of four parts: awareness of climate change (Part A), interest and engagement in climate change (Part B), perception of government policies related to climate change (Part C), and respondent socio-demographic characteristics.

Part A consisted of fourteen items to measure citizens' awareness of climate change (e.g., "How concerned are you about climate change issues? How serious do you think climate change is? How much do you know about the impact of climate change on human rights?").

Part B consists of three items designed to measure citizens' participation experiences and their perceptions regarding the appropriateness of climate change adaptation measures. The items include questions like, "How important do you think each adaptation measure for climate change is?" and "How many times have you participated in public hearings or protests on climate change issues?".

Part C comprised eight items designed to assess citizens' awareness of government policies related to climate change, including transparency in the context of climate change (e.g., "How open do you think the government is in providing information about climate change policies to citizens? Do you believe that the government adequately takes into

account the opinions of the general public when promoting climate change policies?"). Some items also aimed to measure citizens' attitudes toward participating in climate change policy-making (e.g., "To what extent do you think it is necessary for citizens to participate in policy-making to mitigate the negative impacts of climate change on human rights?"). Additionally, the section includes items related to citizens' intentions to participate in climate change policy-making (e.g., "If given the opportunity, would you be willing to participate in the process of policy-making related to climate change?") and their perceptions of political efficacy ("Do you believe that citizens have some influence in the process of policy-making related to climate change?").

Most of the measures were based on positively worded items on four-point Likert scales ranging from agree completely (1) to disagree completely (4). All answers were recoded so that higher scores indicated a higher value on the underlying construct.

The instrument underwent both exploratory factor analysis and confirmatory factor analysis. Exploratory factor analysis was conducted to explore the possibility of integrating related variables into one factor. On the other hand, confirmatory factor analysis was performed to validate whether the indicators of a construct align with the researcher's conceptualization of the nature of that construct.

The initial step involved conducting exploratory factor analysis using the principal axis factoring technique with varimax rotation. Only components with eigenvalues greater than 1 were retained. Items with a communality below 0.40 were removed, and those with factor loadings less than 0.40 were excluded. The analysis yielded two factors for each domain (Part A and Part C): awareness with three items and concern with four items, and attitude with two items and transparency with four items. However, in the exploratory factor analysis, items related to citizens' intentions and efficacy did not meet the minimum communality of 0.40. This is because they have limited associations with other factors, resulting in their extraction as individual variables.

The researcher calculated the Cronbach's alpha coefficient to assess the internal consistency among the items. The Cronbach's alpha coefficient ranges from 0.67 to 0.88; transparency was calculated at 0.88, awareness at 0.78, and concern at 0.67. This range is consistent with appropriate internal consistency [37]. To calculate the reliability of attitude consisting of a two-item scale, the researcher assessed the Spearman–Brown coefficient (0.72). Exploratory factor analysis and reliability analysis were conducted using SPSS 28.0.

Political efficacy and participation intention are each measured with a single item, which measures may suffice for very narrowly defined constructs [38]. Furthermore, there is no difference in effect sizes when the double-concrete dependent variables were measured with single or multiple items [39].

3.3. Analysis Method: Structural Equation Modeling Applying the Phantom Model Approach

To unravel the mechanism underlying the relationship between transparency and citizens' intention to participate in climate change policy-making with the effect of transparency on citizens' intention to participate in climate change policy-making, the researcher used structural equation modeling (SEM) that allows a researcher to manage measurement error, with its strength to test hypotheses based on complex relationships among variables. The data were analyzed using AMOS 26.0.

However, AMOS only provides information on the total indirect effect. Given these practical weaknesses, the researcher estimated and tested each of the indirect effects by applying a phantom model approach that allows the researcher to test the specific indirect effects. The phantom model works by respecifying the specific indirect effects of the covariance structure model as the total effect in an independent phantom model, based on bootstrap procedures, which have been considered more powerful for detecting indirect effects [40]. Therefore, the phantom model approach has strengths for testing specific indirect effects because it can engender bootstrap point estimates, SEs, or confidence limits for specific indirect effects in an SEM program with a bootstrap utility [40].

4. Results

4.1. Testing Common-Method Variance (CMV)

The general method bias or same source bias may arise while utilizing self-report measures from the same sample during a survey [41]. This general method bias, or same source bias is acknowledged as the common-method variance (CMV). It represents the amount of spurious correlation among the variables that may be generated by utilizing the same method in order to measure each variable. Moreover, Shehnaz and colleagues [42] stated that CMV threatens the validity of conclusions about the constructs' association and creates a systematic bias in a study either by inflating or deflating the correlations. Researchers have developed a number of statistical techniques to control for the effect of CMV in mono-method research designs. The Harman single-factor test is one of the techniques that have been frequently employed to test CMV. It requires loading all the measures in a study into exploratory factor analysis, with the assumption that the presence of CMV is indicated by the emergence of either a single factor or a general factor accounting for the majority of covariance among measures [41,42].

To begin, exploratory factor analysis was conducted on the variables of transparency, citizens' intention, political efficacy, awareness, concern, and attitude and the results indicated that the variance explained by the first common factor was 31.29%, which was lower than 40%. Then, a validation factor analysis was conducted on the aforementioned variables, setting the number of common factors to 1 [43], and the results indicated a poor model fit (Ratio of χ^2/df = 7.8, CFI = 0.52, RMSEA = 0.17). The above steps indicated that there was no serious common–method bias in this study.

4.2. Confirmatory Factor Analysis and Structural Model Test

The assessment of data normality is essential before conducting SEM statistical tests because parametric testing relies on the assumption of data following a normal distribution. The normality assessment is made by assessing the measure of skewness and kurtosis for every item using SPSS AMOS 26.0. Both the skewness (−0.773~0.174) and kurtosis (−0.284~1.163) were in an acceptable range to be considered normal.

As a step of SEM, the researcher carried out a confirmatory factor analysis test to assess the validity of the observed variables concerning the latent variable using confirmatory factor analysis. The estimates of the overall goodness-of-fit criteria met their acceptable level (Ratio of χ^2/df = 3.55, CFI = 0.94, RMSEA = 0.07).

Figure 2 and Table 2 depict the structural model analysis results, including the path coefficient significance and the model fit indices. As shown in Figure 2, the overall model fit statistics indicate that the hypothesized model provides a good fit to the data (χ^2/df: 3.90, CFI: 0.91, RMSEA: 0.07). Generally, CFI values greater than 0.95 are recommended [44,45]; however, CFI values greater than 0.90 are considered to be a reasonably satisfactory fit [46–48]. Therefore, CFI may indicate a reasonably good fit for the model.

The researcher has named it the 'Transparency–Engagement Nexus Model' to encompass all the relationships in the research model. This name reflects the central role of transparency in influencing citizens' intention to participate in climate change policy-making and the factors that mediate this relationship, leading to a comprehensive understanding of the model's content and focus. The researcher chose to use 'engagement' in the model name, recognizing its versatility and applicability instead of participation.

Table 2 depicts that the empirical results confirmed that eight paths were at a statistically significant level. More specifically, transparency (B: 0.135, $p < 0.05$), efficacy (B: 0.143, $p < 0.01$), attitude (B: 0.55, $p < 0.001$), and concern (B: 0.492, $p < 0.001$) were significant determinants of citizens' intention to participate in climate change policy-making. Transparency has an effect on efficacy (B: 0.512, $p < 0.001$) and awareness (B: 0.247, $p < 0.001$), and awareness also has an effect on concern (B: 0.988, $p < 0.001$) and attitude (B: 0.516, $p < 0.001$).

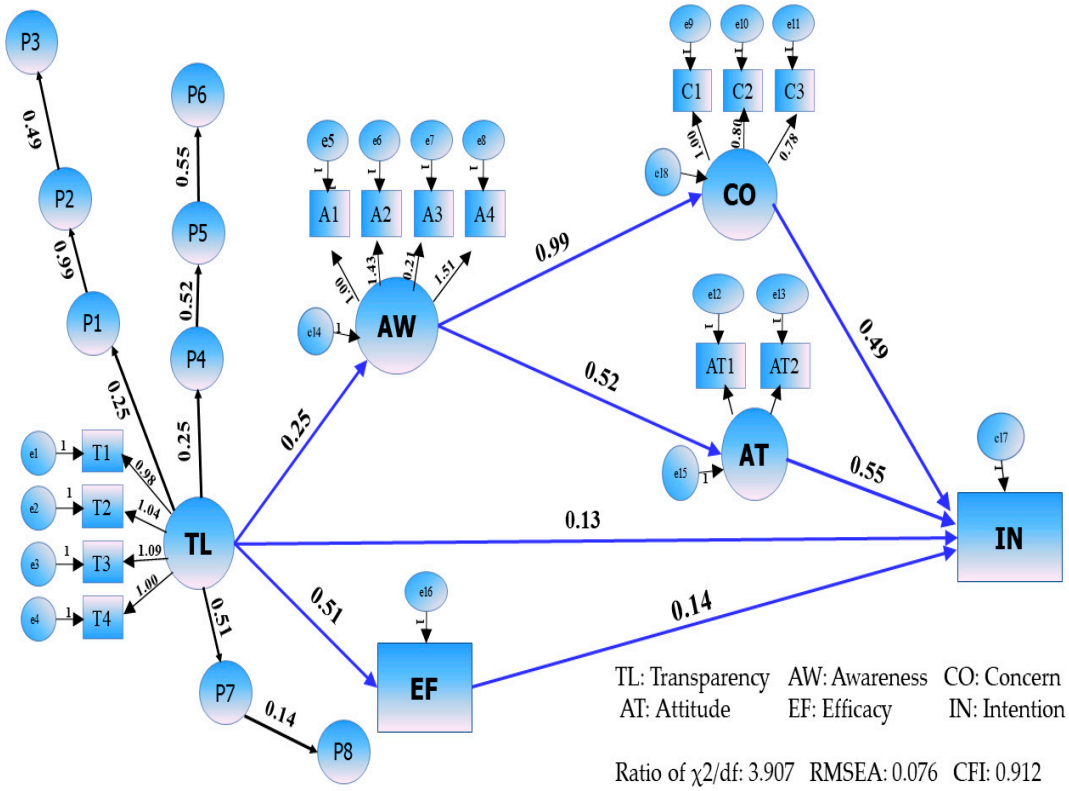


Figure 2. Transparency–Engagement Nexus Model.

Table 2. Path coefficients for direct effects.

Hypothesis	Path	B	SE	*p*	Decision
H1	Transparency → Intention	0.135	0.068	0.049	Support
H2	Transparency → Efficacy	0.512	0.058	***	Support
H3	Efficacy → Intention	0.143	0.049	0.003	Support
H4	Transparency → Awareness	0.247	0.036	***	Support
H5	Awareness → Concern	0.988	0.103	***	Support
H6	Awareness → Attitude	0.516	0.082	***	Support
H7	Attitude → Intention	0.55	0.096	***	Support
H8	Concern → Intention	0.492	0.093	***	Support

Note: *** means $p < 0.001$.

The bootstrap procedure was used to examine the significance levels of indirect effects for the hypothesized model. Table 3 shows the bootstrap estimates of the specific indirect effects of transparency on citizens' intention to participate in climate change policy-making, with 95% confidence bounds based on a 5000 resample.

As seen in Table 3, in line with the hypotheses, the indirect effect of transparency on citizens' intention to participate in climate change policy-making through efficacy (H9) is statistically significant (B: 0.073, 95% CI [0.023, 0.133]) and indirect effect of transparency on citizens' intention to participate in climate change policy-making through awareness and concern in serial (H10) is statistically significant (B: 0.12, 95% CI [0.069, 0.194]). The indirect effect of transparency on citizens' intention to participate in climate change policy-making through awareness and attitude in serial (H11) is statistically significant (B: 0.07, 95% CI [0.039, 0.127]). Hence, all hypotheses predicting the indirect effects (H9, H10, and H11) are supported, implying that transparency has a significantly positive effect on citizens' intention to participate in climate change policy-making indirectly.

Table 3. Bootstrap estimates of indirect effects.

Hypothesis	Path	B	95% Confidence Interval		Decision
H9	Transparency → Efficacy → Intention	0.073	0.023	0.133	Support
H10	Transparency → Awareness → Concern → Intention	0.12	0.069	0.194	Support
H11	Transparency → Awareness → Attitude → Intention	0.07	0.039	0.127	Support

5. Discussion

5.1. Implication

The overall fit of this research model was deemed appropriate, affirming the robustness of our findings and the validity of the conceptual model, which integrates various mediating factors. That strengthens the theoretical foundation of the study and suggests that the proposed model effectively captures the complex interplay of variables related to information transparency and citizen participation intentions. This theoretical validation can contribute to the theoretical advancement in the field of climate policy and participation studies. What is the theoretical contribution and practical implication of the present investigation? The theoretical and practical implications of these research findings are as follows.

First and foremost, the findings of this research offer insights into extending the application of the expectancy–value theory beyond the field of education and into the realm of policy, highlighting its value as a versatile approach. The expectancy–value theory has long served as a valuable framework for comprehending academic achievement, particularly within the realm of education. This theory revolves around the idea that an individual's choices, perseverance, and performance can be better understood by examining their expectancies and the degree to which they value that activity. In essence, it suggests that people are more likely to engage in activities or behaviors when they expect their efforts will lead to a desired outcome and when they attach value or motivation to that outcome [21,22]. Building upon this perspective, the author deemed it meaningful to apply the expectancy–value theory as a valuable lens for understanding the intention to participate in climate change policy-making. Based on this theory, a model was constructed to explain citizens' intentions to participate in climate change policy-making, among other aspects. The research findings confirm a good fit of the research model, showing that expectancy (efficacy) and value (attitude towards participating in climate change policy-making) empirically impact citizens' intentions to participate in policy-making. Hence, this study lays the groundwork for discussing the importance of verifying the suitability of applying the expectancy–value theory, extending its reach from education into the domain of policy.

In addition to the discussed content above, these research findings can also be discussed from a theoretical perspective within the framework of the theory of planned behavior (TPB). In the context of climate change, these relationships between awareness, concern, attitude, efficacy, and intention to participate can also be approached through the TPB. TPB is a well-established psychological theory that explains human behavior, particularly intentions to engage in specific actions. It posits that intentions are influenced by three key factors: attitude, subjective norms, and perceived behavioral control [23]. In the context of climate change policy-making, the author adopted TPB as another lens to explain citizens' intention to participate in policy-making. The research findings confirmed that attitude and self-efficacy significantly impact citizens' intentions to participate in climate change policy-making, reaffirming the utility of TPB in understanding citizens' intention to participate in the context of climate change policy-making. Moreover, since Ajzen proposed TPB [23], an extended version of TPB has been suggested, incorporating variables such as moral obligation in addition to the core variables of TPB, including attitude, subjective norms, and perceived behavioral control [49]. In line with prior studies, this research may also be considered as part of an extended version of TPB, encompassing transparency as

one of its components. However, unlike previous research focusing on the relationship between variables like attitude, perceived control, subjective norms, and moral obligation and intentions, the author not only elucidated the relationships between transparency, attitude, self-efficacy, and intentions but also revealed the mediating relationships among these variables by applying SEM. This unique contribution sets this study apart from previous research, providing valuable insights into understanding human behavioral intentions. Therefore, this study contributes to the understanding of human behavioral intentions, and it provides unique insights into the relationships between the key variables in the context of climate change policy-making.

Thirdly, the present research offers innovative findings of significant value. This study provides strong evidence to support the assertion that transparency has an amplifying effect on the intention to participate in climate change policy-making. These research findings not only examined the direct impact of transparency on citizens' intention to participate in climate change policy-making, but also elucidated the indirect effects. Furthermore, to my knowledge, this is the first study to investigate the psychological processes underlying the relationship between transparency and the intention to participate in climate change policy-making while exploring the mediating role of awareness, attitude, concern, and efficacy. Discovering the relationships and mediating variables between transparency and the intention to participate in climate change policy-making is academically significant and practically valuable. This is because it can enhance our understanding of the complex processes that support citizen engagement in climate change policy decisions. By identifying these mediating variables, the researcher can improve theoretical models and gain a deeper understanding of the relationships among various factors.

Additionally, considering these mediating variables can provide empirical evidence for policy interventions or treatments aimed at citizens' participation in policy-making. For example, the research findings revealed that political efficacy mediates the relationship between transparency and citizens' intention to participate in climate change policy-making. This result supports the assertion that political efficacy is viewed as a pre-condition for political engagement [50]. This suggests that enhancing citizens' efficacy is necessary to strengthen their intention to engage in climate policy-making, and strategies for bolstering efficacy need to be explored. This may include campaigns, civic education, and initiatives enabling citizens to actively participate in climate policy discussions. Additionally, employing various strategies, such as promotion through mass media or social media, to enhance the mediating variable of awareness can be another way to encourage participation. Furthermore, one interesting aspect of this research is the identification of two serial mediations: climate change awareness and concern for climate change, and climate change awareness and attitude towards participating in climate policy-making. This implies that taking a comprehensive approach addressing multiple mediating factors simultaneously may be particularly effective in promoting citizen engagement.

Another significant finding of this study is the direct impact of transparency on citizens' intention to participate in climate change policy-making. This result underscores the importance of granting citizens access to information about climate change policies, as it can positively influence their intention to participate in the policy-making process. In other words, this research finding highlights the significance of improving transparency, which entails making climate-related information more accessible, comprehensive, and readily available to the public. Consequently, policymakers must prioritize the dissemination of clear and comprehensible information regarding climate policies, their objectives, and potential impacts. It goes without saying that this information should be accessible to citizens of all demographics, ensuring that all individuals are well-informed participants in policy-making processes.

When applying the findings of this study to the Korean context, these findings can offer valuable insights for enhancing citizen engagement in climate policy. Specifically, the importance of transparency, as highlighted in this study, is applicable in Korea as well. Ensuring transparency in climate policy-related information can create an environment

where citizens can access and trust information, which is crucial in the Korean context. In response to the increasing likelihood of conflicts between development and conservation interests and the rising demands from citizens for a pleasant environment in the process of formulating and promoting environmental policies, the Ministry of Environment of the Republic of Korea has recognized the paramount importance of promptly disclosing environmental information and sharing information through two-way communication. To this end, the Ministry of Environment established its website, aiming to make environmental information available online. It discloses environmental policies and data on environmental pollution online and adopts a method of soliciting public opinions. Additionally, the Ministry of Environment has developed an environmental policy customer management system to provide environmental policy data tailored to customers and has digitized the processing of citizen complaints, allowing real-time public access to the processing process and results. However, in a recent survey on the government's transparency level regarding climate change, the government's degree of openness about climate change policy information was rated at 2.50, the sufficiency of government-provided information on the impacts of climate change on people was rated at 2.33, the degree to which citizen opinions are considered in the government's climate change policy implementation was rated at 2.32, and the degree to which the opinions of vulnerable populations are considered in the government's climate change policy implementation was rated at 2.08 [36]. The survey results, with most ratings below the midpoint on a four-point scale, indicate a limited level of transparency on climate change.

Therefore, in addition to disclosing information through the homepage, it is essential to make it easily accessible. Furthermore, efforts should be made to regularly update information to reflect the most current data. Outdated information loses its utility, so it is crucial to maintain and refresh information regularly. Alongside this, it is necessary to disclose information regarding government or corporate policies and decision-making processes and subject them to public debate. Information related to policy procedures is frequently not presented in an easily digestible format for the general public. When significant policies are introduced, they tend to be unveiled primarily through press releases, lacking comprehensive details about the underlying context, expectations, and the stakeholders involved in the decision-making process. Additionally, most policy assessments are not readily accessible to the public. When they are accessible, they are often conveyed through intricate research reports, posing challenges for public accessibility and comprehension. Therefore, to boost the transparency of policy processes and encourage citizen participation, it is imperative to be forthcoming with information, even when the results are less than ideal. This approach will enhance the public's understanding and knowledge of policy matters.

Furthermore, the mediating variables identified in this study, such as efficacy, awareness, concern, and attitude, are essential considerations when contemplating citizen engagement in Korean climate policies. When encouraging Korean citizens to actively participate in climate issues, taking into account these variables can lead to more effective citizen education and awareness-raising efforts. Moreover, the indirect effects and pathways identified in this study can provide valuable guidelines for promoting citizen engagement in Korea. Government agencies, non-governmental organizations, and other stakeholders in Korea can use these insights to develop strategies that are more effective in involving citizens in climate policy decisions. In conclusion, the results of this study can offer significant insights for climate policy and citizen engagement discussions in Korea. They can help address critical climate challenges and shape a sustainable future while encouraging more active citizen participation.

5.2. Limitations

This research can not only contribute to our understanding of the factors influencing citizen participation in climate change policy-making, but also provide valuable insights for policymakers seeking to enhance public engagement in addressing one of the most pressing global challenges of our time.

Along with significant research findings, this research has some limitations. One limitation of this study is the specificity of the sample. The sample was drawn from data investigated by the National Human Rights Commission of the Republic of Korea, which applied a proportionate stratified sampling design, considering population distribution by region, gender, and age. While this sample provides valuable insights into the Korean context, its applicability to other regions and cultural contexts is uncertain. Attitudes toward climate change, concern, and participation intentions may differ significantly in other countries and regions, making it challenging to generalize these findings.

Additionally, proportionate stratified sampling based on region, gender, and age helps in achieving a sample that closely mirrors the diversity and composition of the entire population. However, even within gender, age, and regional groups, there can be significant diversity in terms of income, education, occupation, and other factors. Therefore, there is a possibility to miss the opportunity to capture this diversity, which can be critical for a comprehensive understanding of the population. Furthermore, this study's sample size of 500 participants, while adequate for the structural equation model (SEM) [51,52], may limit its generalizability. Larger and more diverse samples are needed to increase the external validity of the findings, allowing for a better understanding of how these relationships apply to broader populations with varying demographics, political contexts, and levels of climate awareness.

This research scope is confined to the variables measured in "The 2021 Survey of Citizens' Awareness on Climate Change and Human Rights targeting adults" [36]. Therefore, it was not possible to reveal the effect of transparency, one of the determinants of intention in the theory of planned behavior, on subjective norms. When approaching the formation of subjective norms as part of the socialization process, it is possible that attitudes are influenced by subjective norms.

Furthermore, in a study [53], it was revealed that "community acceptance," which requires the agency to ensure that the "affected community" has been involved in the process from the beginning, understands the process reasonably, and has the opportunity to contribute meaningfully to agency decision-making. When referencing this study, it is possible to consider the mediating role of community acceptance between transparency and the intention to participate in policy-making. However, due to the limitations in available variables, similar to subjective norm variables, community acceptance variables were not included in the research model. It is believed that a model with the inclusion of this variable would provide a more comprehensive explanation. Therefore, it is proposed that further research is needed to address this limitation. Therefore, this study has limitations in that it did not sufficiently include relational variables in the research model.

Additionally, this research insufficiently constructed the components of the variables included in the research. For instance, the conceptual components of transparency encompass several elements: accessibility, which pertains to the institutional or procedural aspects facilitating the acquisition and utilization of information; accuracy, signifying the extent to which public data aligns with factual accuracy; relevance, indicating the usefulness of information in comprehending specific events; timeliness, focusing on the prompt provision of information, thereby influencing its value; reliability, denoting the level of trustworthiness in methods involved in information creation, collection, and provision; clarity, reflecting the degree to which information is clear and unambiguous in its meaning; comprehensibility, concerning the effectiveness with which the meaning can be understood; and consistency, emphasizing uniformity in content and format [54]. However, this study had limitations in adequately incorporating these elements into the concept of transparency due to constraints on survey items. Subsequent research is needed to address and rectify this limitation.

Although the study identifies statistically significant direct and indirect effects, it primarily focuses on associations rather than causal relationships. While these associations are informative, they do not establish causality. Future research could benefit from employing longitudinal designs to explore causation and better understand how changes

in information transparency, awareness, or attitudes affect participation intentions over time. Future research can build upon these findings by conducting longitudinal studies, exploring cross-cultural variations, and addressing the limitations of this research. Additionally, further research needs to explore potential moderators and contextual factors that may influence the relationships identified in our study, such as cultural, demographic, and socioeconomic variables. Ongoing research will have to continue to refine and expand the model to account for new developments in the field of climate change policy-making. By doing so, researchers will be able to contribute to a more comprehensive understanding of how to effectively engage citizens in addressing the urgent global challenge of climate change and inform evidence-based strategies for fostering informed citizens' participation and building a more sustainable future for all.

6. Conclusions

In conclusion, this research sheds light on a critical aspect of our collective response to the pressing challenges of climate change: the active engagement of citizens in shaping climate policies. By investigating the intricate web of interactions among transparency, efficacy, awareness, concern, and attitude, this study uncovers significant insights that can help guide us toward a more sustainable future.

The findings of this research emphasize the paramount importance of transparency in the context of climate policy-making. Transparency not only directly impacts citizens' intentions to participate but also exerts its influence indirectly through multiple channels, such as enhancing citizens' efficacy and awareness. It serves as a catalyst for more informed, inclusive, and meaningful citizen involvement in climate policy decisions.

Furthermore, the study highlights the crucial role played by mediating factors, particularly efficacy, awareness, concern, and attitude. Political efficacy emerges as a key precondition for active political engagement, indicating the necessity of empowering citizens to feel confident in their role as agents of change. Awareness and concern, intertwined with attitude, serve as crucial catalysts that drive citizens' intentions to participate in addressing climate change.

To address the challenges posed by climate change, our collective response must not only prioritize transparency but also actively foster citizens' efficacy, awareness, concern, and attitude. We must design strategies that acknowledge the interplay of these factors and recognize the pivotal role of community acceptance. This multifaceted approach can pave the way for effective and inclusive citizen participation, ensuring that climate policies are not only well-informed but also broadly representative.

In essence, this research contributes to our understanding of how transparency and its mediating factors can lead to meaningful citizen engagement. By embracing these insights, we can shape climate policies that truly address the complexities of climate change and collectively strive for a more sustainable and resilient future for all.

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