

# PUBLIC ATTITUDE TOWARD PARTICIPATION IN DISCUSSIONS ON ARTIFICIAL INTELLIGENCE IN JAPAN

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## ABSTRACT

The increasing incorporation of artificial intelligence (AI) in our daily lives through various AI-enabled products and services has considerably changed the way our society functions. Therefore, public participation in discussions on AI development, use, and regulation, especially with AI becoming increasingly accessible to the public, is critical. However, few studies have focused on public attitudes toward participation in such discussions. This study focuses on understanding public attitudes toward participation in discussions and exploring factors influencing their intention. The results revealed that respondents tend to support public participation but are less willing to participate themselves. This trend was particularly evident among people 60 years and older.

## KEYWORDS

Artificial Intelligence, Public Attitude, Public Awareness, Discussions on Artificial Intelligence, Online Survey

## 1. INTRODUCTION

Artificial intelligence (AI), through AI-enabled products and services, has increasing applications in the daily lives of people around the world, and has impacted the way our society functions. As mentioned in the OECD report, in addition to AI “contributes to better lives and helps people make better predictions and more informed decisions,” “is also fueling anxieties and ethical concerns.” (OECD 2019) Concerns remain regarding the development and societal implementation of AI and regulation as well as ethical issues. Studies have focused on public concerns and opinions because these play critical roles in discussions. Such studies have investigated the level of awareness and understanding of AI and perceptions toward AI. They also reveal expectations and trust in governmental corporations, multi-stakeholder institutions for developing and managing AI, and their opinions on the development of AI and the preferred direction of future development.

Cave et al. (2019) conducted a national survey of the UK population on the awareness and perceptions of AI and revealed that respondents had a negative perception of AI and felt that they had no control over its development. They stated that negotiating the deployment of AI requires overcoming these anxieties. Selwyn and Cordoba (2021) surveyed the Australian public regarding their level of awareness of AI development and the extent of change in AI support with additional exposure to information. The results revealed that the majority of respondents considered themselves to have limited knowledge of and familiarity with AI and were open to changing their opinions based on additional knowledge. This result suggests that public education on AI is critical. Kelly et al. (2021) surveyed 10,005 respondents from eight countries and six continents on their public perception of AI. They investigated sentiments toward and knowledge of AI, thoughts on its future and impact on society, and opinions on its responsible development and use. Regarding sentiments toward AI, differences were observed between countries. Although respondents perceived AI to be transformative and their expectations of AI-related change were not always positive in all countries, clear differences were observed between countries in terms of future effects. These studies suggest that negative public attitude and insufficient knowledge of AI had an indirect negative effect on AI development and regulation. This phenomenon suggests the necessity for public education on AI. Here, the public is not considered an active participant in the discussion, but as influencing the debate from the outside.

Zhang and Dafoe (2020) investigated Americans' perceptions of 13 types of AI governance and their trust in various actors to develop and manage the development and use of AI. The survey revealed that the respondents considered all AI governance challenges to have high issue importance and did not necessarily trust actors. Zhang and Dafoe mentioned, "As in these other policy domains, we expect the public to become more influential over time in impacting AI policy", and although the public is not a policy maker, they are expected to play a critical role in shaping policies. They considered the public to directly influence discussions.

Ema et al. (2016) stated that AI requires responsible research and innovation (RRI: Owen et al. 2012) with the collaboration of various stakeholders, including the public, from early stages. Therefore, they conducted a survey on the attitudes toward AI with various stakeholders, including the public, and aimed to suggest perspectives on future collaborations among stakeholders. Thus, public involvement is critical in discussions on AI development, use, and regulation, especially with AI becoming increasingly accessible to the public. However, few studies have focused on public attitudes toward participation in such discussions.

This study focused on understanding public attitudes toward participation in discussions and exploring factors influencing intention. The results can provide considerable insight into promoting collaboration among stakeholders in discussions.

## 2. METHOD

### 2.1 Sample

An online survey was conducted in December 2021. The respondents were members of an online market research panel with approximately 13 million members. A request to participate in the survey was sent to members of the online market research company until sufficient responses were received, following which people with similar answers to all questions were eliminated. A total of 1976 valid responses were collected. Based on responses to two questions regarding awareness of AI, we narrowed down the target population to those who had heard of AI but had never been involved in it in their daily lives or work. A total of 1334 responses were analyzed. Demographic data are presented in Tables 1 and 2.

Table 1. Sex of participants

Sex	Frequency
Male	634
Female	700

Table 2. Age of participants

Age	Frequency
20–29	210
30–39	245
40–49	264
50–59	289
60+	326

### 2.2 Questionnaire Design

The questionnaire consisted of sets of a series of multiple-choice and open questions. This study addressed multiple-choice questions related to the public awareness of AI and attitudes toward public participation in discussions on how to use AI in society. Regarding awareness, respondents were asked: "Have you ever heard about artificial intelligence (AI)?" and "Are you involved with artificial intelligence (AI) in daily life or your work?" These two questions were used to determine the target respondents. Furthermore, questions

were posed regarding the sources of information on AI and self-assessment of AI-related knowledge. Regarding attitudes toward participation, respondents were asked to what extent they agreed with the following statements: “Public should be involved in determining how to use artificial intelligence (AI) in society” and “I wish to be involved in determining how artificial intelligence (AI) will be used in society.”

To investigate factors influencing attitudes toward participation, six questions (see Table 3) were designed based on Omae et al. (2020). They evaluated AI education practices for promoting AI-related career development for elementary school students. They defined AI-related career development as “To acquire a desire to contribute toward society through AI.” They assumed that educational practices do not promote career development directly but are mediated by improved motivation. Therefore, as stated in Eccles’ expectancy-value theory (EVT; Eccles and Wigfield 2002), they adopted three factors, namely intrinsic value, attainment/utility value, and expectancies for success as motivational factors influencing AI-related career development. EVT has been extensively used to examine motivational and achievement-related behaviors of elementary school students as well as to investigate parents’ motivation related to involvement in their child’s education. Omae et al. mentioned that career development is not equivalent to achievement motivation, but they adopted these three factors because another study (Omae 2016) revealed the usefulness of EVT in explaining career choices. Their results confirmed that these three factors positively influence AI-related career development.

Although attitudes toward participation in the discussions in this study are not equivalent to achievement motivation, they are similar to contributions to society, as described by Omae et al.’s definition of career development. Therefore, these three factors were included in this study.

Table 3. Questions pertaining to factors associated with attitude toward participation

Intrinsic value
I am interested in artificial intelligence.
I like artificial intelligence.
Attainment/utility value
I think artificial intelligence can be useful to society.
I think artificial intelligence is important to my life.
Expectancies for success
I am confident that I can influence the future development of artificial intelligence.
I am confident that I can learn about artificial intelligence.

### 3. RESULTS AND DISCUSSION

#### 3.1 Awareness of AI

Among respondents, 84.8% respondents answered that they had heard of AI. By contrast, other surveys of the UK and Australian public report stated that 85% and 89.4% of respondents, respectively, claimed that they had heard about AI. In terms of awareness, this result was not different from that in other countries. Table 4 details the percentage of responses to questions and statements regarding respondents’ involvement. The responses were multiple-choice. Of these responses, 1334 respondents who answered that they had never been involved with AI in their daily lives or at work were included in the analysis.

Table 4. Responses to questions and statements pertaining to “involvement in AI”

Involvement	percentage
I am/was involved in the development or research of AI technology	2.7
I am/was involved in the development and planning of AI-based products and services	3.4
I use/have used artificial intelligence in my work or activities	4.3
I use/have used artificial intelligence in my daily life	9.5
I have learned about AI	6.0
Other	2.0
I have never been involved with AI	80.0

Regarding self-assessment of AI-related knowledge, 26.8% of the Australian public investigated by Kelly et al. described themselves as knowing “a lot” or “a fair bit.”. In contrast, the percentage of public respondents in Japan who marked themselves as “very knowledgeable,” “knowledgeable,” or “rather knowledgeable” was only 2.6%, a significantly low value.

The responses to questions about the sources of information on AI are presented in Table 5. Many respondents received information from TV/Internet news, TV shows, and newspapers. Few respondents answered questions related to SNS, friends, family, or work. According to Kelly et al. (2021), the top five were social media (45%), TV reports and commentaries (42%), movies or TV shows (40%), magazines or online articles (32%), and family and friends (31%). Compared with their results, the Japanese public does not seem to talk about AI on a personal level.

Table 5. Responses to questions pertaining to sources of information regarding AI

TV news	76%	Movie	15%	Others	7%
Internet news	38%	SNS	12%	Advertisement	4%
TV shows (except News)	32%	Friends and Family	11%	At work	4%
News Paper	29%	Books	11%		

## 3.2 Attitude Toward Public Participation in Discussion

### 3.2.1 Support and Intention

Figures 1 and 2 detail the responses to questions about the support and intention for public participation. More than half of respondents (52.8%) answered “strongly agree” or “agree” with “Public should participate in determining how to use AI in society.” “Strongly agree” or “agree” was more prevalent in the age range of 60 years old and older (62.3%) and 20–29 years old (56.5%). By contrast, response was relatively low among 30–39-year-old participants (42.4%).

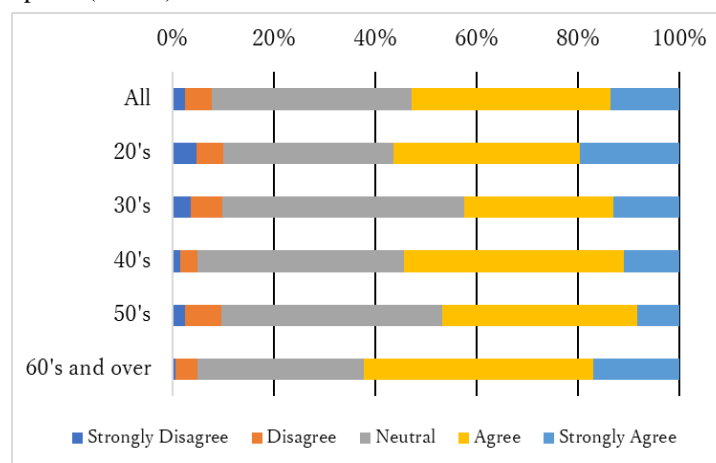


Figure 1. Responses to questions about support

Less than a quarter of respondents answered “strongly agree” or “agree” with “I would like to be involved in determining how AI will be used in society.” Regarding support for public participation, positive responses were high among 20- to 29-year-old people (23%) and low among 60-year-old and older people (20.6%). This result indicates that respondents tend to support public participation but are less willing to participate themselves.

To examine the influence of age and sex on support and intention, the Mann–Whitney test and Kruskal–Wallis tests were conducted. The results indicated a statistically significant difference between age groups only for support ( $p < 0.001$ ). Furthermore, multiple comparisons confirmed that statistically significant differences were observed between people in the age ranges 20–29 and 30–39, 30–39 and 60+, and 50–59 and 60 to 60+. This result suggests that the tendency to support public participation but to be less willing to participate by themselves is particularly strong among people aged 60 years and older. Although they revealed high levels of support for public participation, their keenness to participate was low.

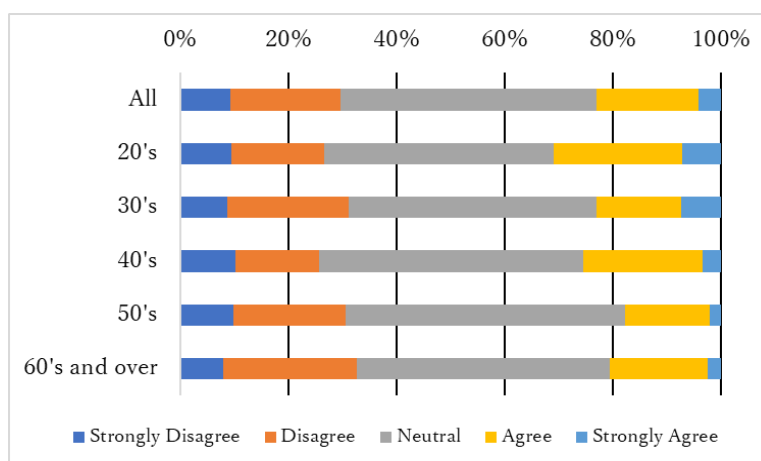


Figure 2. Responses to questions pertaining to intention

### 3.2.2 Factors Influencing Support and Intention

To investigate the differences in the three factors according to the extent of support and intention, respondents were categorized into three groups according to their answers to each question. The respondents who answered “strongly disagree,” or “disagree” were grouped into “Negative,” those who answered “neutral” were grouped into “Neutral,” and those who answered “strongly agree” and “agree” were grouped into “Positive” respectively. Regarding items related three factors, respondents were asked to choose from five options, namely “strongly disagree,” “disagree,” neutral,” “agree,” and “strongly agree.” Each response was converted into a score on a Likert-type scale ranging from one to five. The average of the two items categorized for each factor was calculated as the score for each respondent. Tables 6 and 7 detail the number of respondents and average scores in each group.

The results of the Kruskal–Wallis test indicated statistically significant differences in the scores of the three factors between groups by opinion and intention. With regard to opinion, multiple comparisons confirmed that statistically significant differences were observed in the score of intrinsic value between all groups, in the score of attainment/utility value between “positive” and “negative,” and “neutral”, and in score of expectation for success between “negative” and “neutral,” and “positive” respectively. In all cases, the scores of three factors tended to be high in the “positive” group.

Table 6. Support: Number of respondents and average of scores in each group

	Number of respondents	Average of scores		
		Intrinsic value	attainment/utility value	Expectancies for success
Negative	102	2.4	2.8	2.1
Neutral	525	2.8	3.2	2.6
Positive	702	3.2	3.6	2.7
p-value		< 0.001	< 0.001	< 0.001

Table 7. Intention: Number of respondents and average of scores in each group

	Number of respondents	Average of scores		
		Intrinsic value	attainment/utility value	Expectancies for success
Negative	394	2.5	3.1	1.9
Neutral	630	3.0	3.3	2.7
Positive	306	3.6	3.9	3.2
p-value		< 0.001	< 0.001	< 0.001

The results of multiple comparisons confirmed that statistically significant differences were observed in the scores of intrinsic value and expectation for success between all groups, in the score of attainment/utility value between “positive” and “negative,” and “neutral”. Similar to the responses for questions pertaining to support, in all cases, the scores of three factors tended to be high in the “positive” group. This result suggests that these three factors may be related to public participation support and intention.

The Kruskal–Wallis test was conducted to investigate the differences in the scores of the three factors between age groups. The results indicated statistically significant differences in intrinsic and attainment/utility values between the age groups. With respect to the intrinsic value, multiple comparisons confirmed statistically significant differences between the ages of 60 years old and older and 30–39, 40, and 50–59 years old respectively. In all cases, the scores of 60 years old and older was higher than those of other groups. Regarding the attainment/utility value, a statistically significant difference was observed between 50–59 years old and people aged 60 years and older. Individuals aged 60 years and older may find AI useful and important because of their interest in it.

Table 8. Average of scores in each group by age

Age	Average of scores		
	Intrinsic value	attainment/utility value	Expectancies for success
20–29	3.0	3.4	2.7
30–39	3.0	3.3	2.6
40–49	3.0	3.4	2.6
50–59	2.9	3.3	2.6
60-	3.2	3.5	2.5
p-value	0.001	0.007	0.300

## 4. CONCLUSIONS

An online survey was conducted in Japan to understand the public awareness of AI and attitudes toward public participation in discussions.

In terms of awareness, the result was not different from other countries. However, compared with the results of other studies targeting the public in other countries, knowledge of AI is the least, and AI does not seem to be a topic of personal conversation among Japanese respondents.

Regarding attitudes toward public participation in discussions, this result suggested that respondents tend to support public participation, but were less willing to participate. This trend was particularly evident among people 60 years and older. This result suggested that the three factors, namely intrinsic value, attainment/utility value, and expectancies for success, might be related to the support and intention of public participation. Individuals aged 60 years and older may find AI useful and important because of their interest in it.

While the results related the awareness of AI were compared the with the results of studies conducted in other countries, the results related the attitudes toward public participation in discussion were not compared. In the future, it is hoped that similar surveys will be conducted in other countries in the future.

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