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[Iram Mustavi Chowdhury](#)* and Ashef Iftihaj Munir

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Article

Understanding the Perception of Young Citizens of Bangladesh Toward the Ruppur Nuclear Powerplant

Iram Mustavi Chowdhury * and Ashef Iftihaj Munir

Department of Mechanical Engineering, Military Institute of Science and Technology, Dhaka, Bangladesh

* Correspondence: irammustavi03@gmail.com

Abstract: This study examines young people's perceptions of the Ruppur Nuclear Power Plant in Bangladesh to acknowledge the possible stakeholder role that they may play in energy policy decisions. Through a survey of 105 participants, various perspectives and levels of knowledge on nuclear power are evaluated, emphasizing the need for targeted educational initiatives. The study investigates the factors influencing public perceptions and worries about the Ruppur Nuclear Power Plant. Beyond its academic implications, the study offers recommendations to legislators, educators, and campaigners for how to teach youth about nuclear energy. By understanding and addressing the concerns expressed by young people, this research aims to encourage constructive dialogue and hasten the development of sustainable energy policies in Bangladesh.

Keywords: Ruppur nuclear power plant; attitudes; young citizens; public perception; energy policy; Bangladesh

Introduction

As different countries worldwide strive to find a balance between their rising energy needs and the need for environmental conservation, nuclear power has emerged as one of the most contentious but significant elements of the world's energy mix [1]. In Bangladesh, Ruppur Nuclear Power Plant construction will make for an important stride towards attaining energy security and reducing dependence on fossil fuels [2]. However, public opinion plays a vital role in determining whether such ventures are feasible or not especially among young people [3,4]. With rapid industrialization and urbanization, Bangladesh must satisfy its energy requirements to maintain its present pace of economic expansion [5]. The commencement of nuclear energy generation by the Ruppur Nuclear Power Plant manifests a shift away from conventional power sources by the government to address concerns over ecological impacts as well as boost national security against unstable supply scenarios arising from renewable forms [6]. Nevertheless, there is debate surrounding the use of nuclear power stemming from issues ranging from long-term waste storage to hazards to safety and the environment [7]. It is therefore important to understand what young people think about Ruppur Nuclear Power Plant in terms of attitudes, beliefs, and issues so that informed choices can be made and public acceptance can be promoted regarding nuclear energy as a serious alternative for this country's future sources of power [8].

While studies on public attitudes towards nuclear power exist in various parts of the world, such as Jordan [9], the United Arab Emirates [10,11], Japan [12], the Philippines [13], and South Africa [14], there is a dearth of research focusing specifically on the perspectives of young Bangladeshis. Given their role as future leaders and decision-makers, it is imperative to explore their attitudes towards nuclear energy and the Ruppur Nuclear Power Plant. [15] This is seen in the study conducted in the Philippines, where an online questionnaire consisting of 31 items was distributed using a purposive sampling approach and 450 respondents of Generation Z voluntarily answered. The respondents perceived the benefit of the Nuclear Power Plant as slightly higher than the perceived risk. With

these, it was clear that the commissioning Nuclear Power Plant could be considered as an alternative source of electric energy in the Philippines. As such, this study also aims to study different viewpoints and levels of knowledge about nuclear power, to identify lacking general awareness of the young public so that further consultation can be arranged.

This study therefore intends to explore the Ruppur Nuclear Power Plant from various standpoints of attitudes and perceptions among young citizens in Bangladesh. This research will focus on aspects such as familiarity, trust in safety measures, ecological apprehensions, and socio-economic effects to generate insights that can influence public dialogue, policy creation, and community-connecting strategies toward nuclear development in Bangladesh.

Methodological Approach

2.1. Methodology

This study used a cross-sectional survey, conducted on a predetermined population at a single point in time and a quantitative research methodology to investigate how young people perceive the Ruppur Nuclear Powerplant. The participants for the survey were mostly engineering undergraduate students from the Military Institute of Science and Technology (MIST), Bangladesh. This is because of the presence of diverse types of students (both Civilians & Military students). Furthermore, MIST has a Nuclear Engineering Department, making it a more viable option aligning with research goals. Moreover, this was much more convenient for authors to provide questionnaire. To collect responses for the e-survey questionnaire, the authors contacted about 400 undergraduate students from several departments and disciplines and gave them a Google Form-based questionnaire created especially for this study. While the rest of the data were from pupils known by authors. They were informed about the survey's subjects, which had a direct bearing on Bangladesh's nuclear power plant. A total of 105 responses were received. The goal of this thorough investigation was to comprehend Bangladesh's nuclear energy strategy and young perceptions.

2.1. Research Questions

For this study, a questionnaire consisting of two parts and 10 multiple-choice questions was created following a five-point Likert scale. Section 1 began with standard inquiries on the gender, age, institution, educational history, and qualifications of the students. In Section 2, students' awareness of and perceptions of nuclear power plants are assessed. Additionally, multiple-choice questions are included, with the options "agree" and "strongly agree" denoting agreement with the policies under discussion, "disagree" and "strongly disagree" denoting disagreement, and "neutral" denoting neither strong support nor opposition to the policies under discussion. The Questionnaire was developed and verified with the help of an Expert and with the help of previously conducted research.

Table 1. Questionnaire.

Symbol	Questions
Q1	The Ruppur Nuclear Power Plant will contribute to meeting Bangladesh's energy needs sustainably
Q2	I feel adequately informed about the safety measures implemented at the Ruppur Nuclear Power Plant.
Q3	The construction and operation of the Ruppur Nuclear Power Plant will have positive economic impacts on the local community.
Q4	I trust the government's decision-making process regarding the implementation of the Ruppur Nuclear Power Plant project.

Q5	Concerns about nuclear accidents or radiation leaks make me apprehensive about the Ruppur Nuclear Power Plant.
Q6	I believe that renewable energy sources like solar and wind power are better alternatives to nuclear power.
Q7	Public consultations and community engagement regarding the Ruppur Nuclear Power Plant project have been sufficient.
Q8	The Ruppur Nuclear Power Plant project should be halted or canceled due to environmental concerns.
Q9	I believe that nuclear power is necessary for Bangladesh's future energy security.
Q10	Overall, I support the construction and operation of the Ruppur Nuclear Power Plant.

2. Results and Discussion

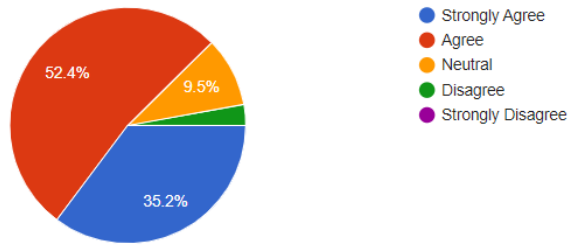
2.1. Demographic Information

The total number of complete or partially complete questionnaires was 105. Among them the number of female respondents was 26, the number of male respondents was 70, and 9 participants preferred not to disclose. The gender disparity occurred due to the presence of fewer female students in engineering universities in Bangladesh. In terms of age, the majority (84) falls within the 18-24 age group, followed by 16 participants in the 25-34 while the rest are in under 18 and other categories. Regarding educational background, 66 participants are undergraduate students, 26 are high school students, and 10 are pursuing master's or above degrees, and the distribution across engineering, medical, business, and social/environmental/other fields is 95, 4, 4, and 2, respectively.

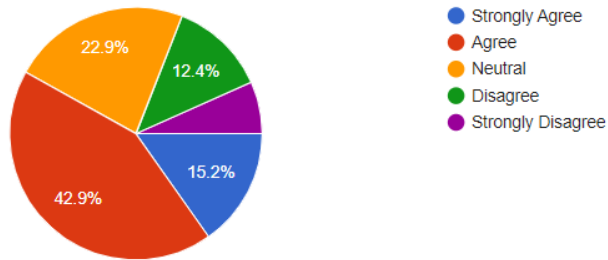
Table 2. The demographic composition of the samples.

<i>Demographic profile</i>	<i>N(number)</i>	<i>%</i>
Gender		
Female	26	24.8
Male	70	66.7
Preferred not to say	9	8.5
Age		
Under 18	4	3.8
18-24	84	80
25-34	16	15.25
Other	1	0.95
Education		
High school students	26	24.8
Bachelor's students	66	62.8
Master's degree & above	10	9.5
Other	3	2.8
Field of study		
Engineering	95	90.5
Business/management	4	3.8
Medical/health science	4	3.8
Other	2	1.9

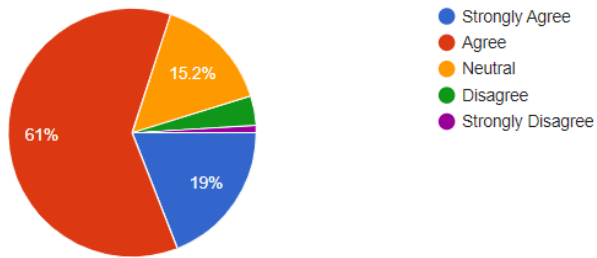
2.1. Respondents' Opinion about Ruppur Nuclear Powerplant



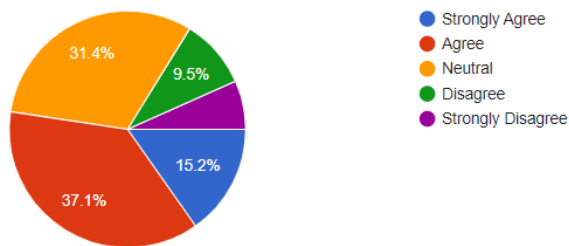
(a)



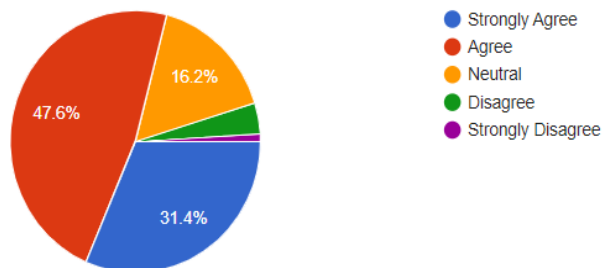
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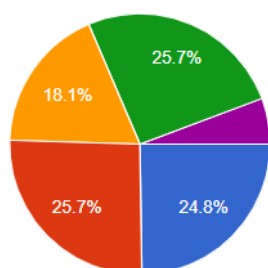
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(d)

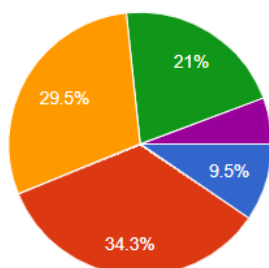


(e)



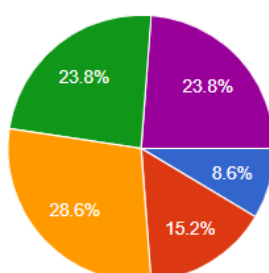
● Strongly Agree
● Agree
● Neutral
● Disagree
● Strongly Disagree

(f)



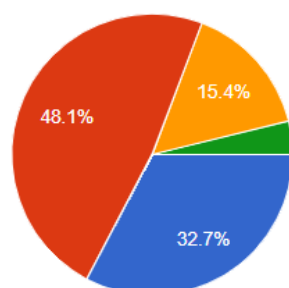
● Strongly Agree
● Agree
● Neutral
● Disagree
● Strongly Disagree

(g)



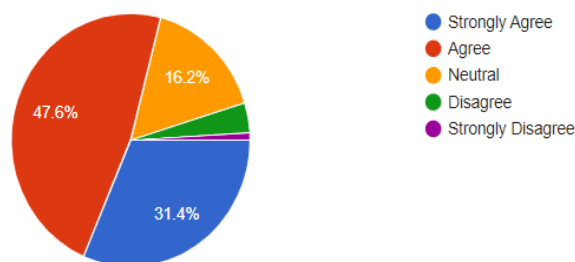
● Strongly Agree
● Agree
● Neutral
● Disagree
● Strongly Disagree

(h)



● Strongly Agree
● Agree
● Neutral
● Disagree
● Strongly Disagree

(i)



(j)

Figure 1. (a) Respondents' opinion on Q1; (b) Respondents' opinion on Q2; (c) Respondents' opinion on Q3; (d) Respondents' opinion on Q4; (e) Respondents' opinion on Q5; (f) Respondents' opinion on Q6; (g) Respondents' opinion on Q7; (h) Respondents' opinion on Q8; (i) Respondents' opinion on Q9; (j) Respondents' opinion on Q10.

The vast majority of participants in this survey agreed with the advantages of Ruppur Nuclear Powerplant. Remarkably, 52.4% strongly agreed and 35.2% agreed that the Ruppur Nuclear Power Plant will help Bangladesh sustainably satisfy its energy needs. Furthermore, a substantial majority of respondents (32.7% strongly agree, 48.1% agree) supported the installation of nuclear energy sources, 20.3% strongly agreed and 53.3% agreed that this project should be implemented. In addition to their positive answers, respondents expressed serious concern about radiation leaks and nuclear accidents (31.4% strongly agreed and 47.6% agreed). Regarding whether or not renewable energy sources like solar and wind power would be preferable to nuclear power, participants were split evenly (25.7%). When asked if they trusted the government's decision-making process regarding the implementation of the Ruppur Nuclear Power Plant project, 37.1% of participants agreed and 31.4% were neutral.

2.1. Statistical Analysis

Table 3. Data analysis.

Questionnaire	Mean	Standard Deviation	Mode
Awareness	4.2	3.73	Agree
Knowledge Level	3.47	3.13	Agree
Positive Economic Impact	3.93	3.48	Agree
Feasibility Factors	3.44	3.09	Agree
Concerns	4.04	3.61	Agree
Alternatives would've been better	3.38	3.10	Agree/Disagree
Sufficient Public consultations	3.21	2.86	Agree
Cancellation of project	2.61	2.39	Neutral
Better for the Future	4.057	3.63	Agree
Overall Support	3.84	3.42	Agree

These results, which emphasize the generally favorable public perception and awareness of the Ruppur Nuclear Power Plant, highlight the necessity of addressing concerns and fostering better understanding, particularly among those with neutral or dissenting perspectives, to gain wider support for the plant. The vast majority of participants in this survey agreed with the advantages of the Ruppur Nuclear Powerplant. Remarkably, 52.4% strongly agreed and 35.2% agreed that the Ruppur Nuclear Power Plant will help Bangladesh sustainably satisfy its energy needs.

2.1. Limitations or Biases

This study primarily surveyed engineering undergraduate students from the Military Institute of Science and Technology (MIST), with a specific emphasis on those with a potential interest or exposure to nuclear energy due to the presence of a Nuclear Engineering Department. As such, the findings may reflect a higher level of awareness and favorable perceptions of nuclear power than might be observed in a broader, more demographically diverse sample. The purposive sampling approach and reliance on respondents known to the authors further introduce the potential for sample bias. Future studies should consider more diverse and representative sampling strategies to ensure broader generalizability of the results.

Conclusion

The examination of public sentiments unveiled insights, such as understanding of opinions, which allowed us to assess the level of knowledge, and acceptance that promotes the positive perception of the youth towards the prospect of the Ruppur Nuclear Powerplant in Bangladesh, five central findings come to light:

- 1) *The survey highlights the significant influence of the youth demographic on shaping public opinions, shedding light on their attitudes towards the Ruppur Nuclear Powerplant in Bangladesh.*
- 2) *With a significant majority of support (53.3%) for Nuclear energy, there still exists a substantial opportunity for technological improvements in Bangladesh's sustainable energy landscape for the near future.*
- 3) *Despite the majority showing a positive attitude toward Nuclear energy sources, 79% of respondents showed concerns about nuclear accidents and radiation accidents.*
- 4) *Respondents seem to be split on whether other renewable energy sources are better than nuclear energy sources.*
- 5) *To further increase trust in the government's decision-making process, it is essential to arrange ways to reach general people and to enlighten them on the process, benefits, risks, and safety measures that have been taken.*

Conflicts of Interest: The authors declare no conflicts of interest.

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