PUBLIC PERCEPTION OF SMR TECHNOLOGY IN THAILAND: YOUTUBE-BASED SENTIMENT ANALYSIS

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EXTENDED ABSTRACT

Thailand is moving forward with its clean energy transition to strengthen sustainability and enhance national competitiveness. As part of this effort, the country aims to become a regional leader in carbon reduction and develop itself as a carbon credit trading hub within ASEAN. Small Modular Reactors (SMRs) are expected to supplement energy storage and renewable energy sources in the energy mix of the country. SMRs offer the potential to provide sustainable, reliable, and low-carbon electricity and heat, supporting the country's long-term decarbonization goals. By 2024, public hearings for two SMR projects, each with a capacity of 300 MW, had already taken place, reinforcing the significance of public engagement and perception in advancing nuclear energy programs in Thailand.

To explore public attitudes toward nuclear energy and SMRs, the Thailand Institute of Nuclear Technology (TINT) and its partners conducted a comprehensive study analyzing social media comments related to nuclear energy on Facebook and YouTube. The study involved three primary methodological stages: comment collection, sentiment analysis, and public perception interpretation. In the comment collection process, relevant public comments were gathered using both the Export Comments website and the Application Programming Interface (API) functions available on Facebook and YouTube. The team searched for Thai keywords such as "nuclear energy," "nuclear power," "nuclear power plant," and "small modular reactor" across posts, news content, and public discussions available on these platforms. To maintain relevance, comments from content related to nuclear weapons or war were excluded. The data set comprised 10,975 Facebook comments from 520 posts dated 2009–2022 and 15,425 YouTube comments from 85 videos published between 2008–2023. It was observed that the discussions about nuclear energy have increased significantly in recent years, indicating a gain in public knowledge. For the sentiment analysis stage, the study employed Bidirectional Encoder Representations from Transformers (BERT), a deep transfer learning-based Natural Language Processing (NLP) model. The pre-trained BERT model was fine-tuned using a manually labeled dataset of Thai-language comments to optimize its performance in classifying sentiment specific to nuclear energy discussions. The classification process assigned sentiment values ranging from -1 (negative) to 1 (positive), with 0 representing neutral sentiment. Sentiment strength was categorized into strong, moderate, and weak levels based on confidence scores derived from previous BERT research applications. The fine-tuned model was applied to both Facebook and YouTube comment datasets to generate a comprehensive sentiment profile for each platform. In the public perception analysis, the most occurring keywords and phrases within Facebook and YouTube comments were identified using the WordItOut platform for word cloud generation and frequency analysis. This helped trace public narratives, common concerns, expectations, and misunderstandings about SMRs. The comments that mentioned SMRs were separated out for more in-depth topic classification. These comments addressed topics such nuclear safety, security concerns, technological readiness, regulatory readiness, accessibility, and misconceptions regarding nuclear technology. Both the positive and negative opinions expressed by the Thai population were shown by the qualitative interpretation.

Results showed that 81.22% of Facebook comments were neutral, 6.49% positive, and 12.28% negative. On YouTube, 89.86% of comments were neutral, 4.77% positive, and 5.36% negative. Supportive comments often acknowledged the

potential of nuclear energy as a clean, safe, and advanced energy source and expressed approval for constructing SMRs and other nuclear facilities. In contrast, negative comments reflected concerns over nuclear safety, radioactive risks, government readiness, and skepticism regarding the necessity of nuclear power in Thailand. The keyword "SMR" appeared in both positive and negative comments, signaling a mixed perception within the public discourse. Further analysis of SMR-related comments revealed recurring themes such as the importance of technological development, opportunities for accessible clean energy, nuclear safety, security, safeguards, and public misconceptions about nuclear technology. The differences between Facebook and YouTube sentiments were attributed to the distinct ways information is communicated and shared on each platform. The findings from this study provide valuable insights for shaping future public communication strategies and supporting public acceptance initiatives for SMRs and nuclear power programs in Thailand. This data will contribute to informing the country's Power Development Plan (PDP 2024–2040) and enhancing national energy policy development as Thailand prepares for its clean energy transition and carbon-neutral goals.

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