



General Public Opinion on the Type and Source of Renewable Energy

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Abstract

In regards of combating climate change as well as maintaining safety of the public, alternative sources is receiving more attention than ever before. Internal combustion engine greenhouse emissions have become a major societal problem. Despite the fact that the South Korean government is involved in developing different regulations to help rechargeable hybrid cars gain traction with in automobile industry, their efforts were in vain. Because forms of energy are so closely linked to personal minds, it's critical to determine the public's willingness to tolerate alterations with in electricity sector. As a result, the goal of this research is to examine differences in preferences regarding impact on energy resource shares. This research utilized a mixed log it model to estimate preference, which reflects the reference point by taking into account the respective proportions of sources of energy as well as the percentage of characteristics. Furthermore, this research utilized a Bayesian Hierarchical logistic regression analysis to see whether public factors influence preferences for electrical service features. The findings indicate that the Korean public has a high level of acceptance for policies that expand renewable sources of energy. And according to findings, the respondent's degree of teaching had a noteworthy impact on their desire to expand renewable energy sources.

Keywords: Energy policy; Government, Public acceptance; Preference; Renewable energy

Introduction

Though the administration's main responsibility is to establish detailed goals for overall power production as well as each source of energy, authorities must also take into account the unpredictability of energy demands. As a consequence, the primary energy strategy is frequently concerned with determining the relative contributions of various energy resources to total power production. In this scenario,

raising the proportion of one source of energy would be only feasible if indeed the share of all other sources of energy falls. As a result, transitioning toward a lower-carbon energy mixture necessitates a decrease in the proportion of coal-fired power plant, that necessitates an uptick of solar and wind power, including renewable and alternative energy.

Throughout the instance of renewable resources, the Korea government had earlier set a goal of increasing their proportion to 11% by 2020 [1]. The current government, on the other hand, has launched the Renewable 3020 initiative, which aims to boost sustainable energy use through up to 20% by 2030. The plan also says that nuclear and coal-fired power production share would be reduced by 20-23.9% and 36.1%, respectively. Although intermittent energy costs are decreasing, they are still much higher than nuclear and coal-fired power production costs. Furthermore, the cost of increasing the proportion of alternative energy sources, which might be placed on the general population, will rise.

Individuals in Europe are more inclined to take the president's nuclear power station closure (or decrease of its share) than they are to oppose an increase in power bills due to the development of renewable energy sources. Following the Fukushima Daiichi nuclear catastrophe in 2011, the German government prohibited the building of just about any nuclear power stations. Unlike Germany, the Koreans are adamantly opposed to any rise in the energy cost, particularly taxation [2].

There has never been a survey on energy policies since the Korean constitution restricts referendums to national security matters defence, diplomacy, and reunification. As a consequence, a questionnaires poll was undertaken to determine public preferences about increasing energy source percentages. The separate choices experiments, a surveying tool, was also employed to predict public support of sustainable energy development as well as how often any more people are ready to spend on it [3]. Information evidence from either the stochastic frontier experiment is analyzed utilizing the separate choice model. The majority of previous studies that utilized this model to examine public preferences for power supply as well as renewable energies implemented the ownership stake of either energy resource by showing it at the individual dimension straight in model.

The public, on the other hand, does not consider the absolute amount of characteristics that make up hypothetical alternatives while evaluating them. Rather, they use the relative difference between the existing form like a point of comparison as well as the characteristic degree about an alternate when evaluating alternatives. The proportionate characteristic levels of a goods or services depending on a point of reference, instead of the pure attribute levels of a goods or services, had a significant role in shaping the claimant's choices, according to mainstream economics and psycho-graphic analytic study [4]. Furthermore, a research claims that model showing the recommendation function is superior to conventional financial paradigm when it comes to consumer behavioral science.

Modifications in the percentage of a source of energy are comparative and influenced by the proportion of all the other source of energy, particularly when reference-dependent desires are taken into account. Despite this, there is virtually no research that uses a point of comparison inside the discrete choice paradigm to examine differences in preferences regarding changes in energy source shares. As a result, the goal of current research is to use the reference points for assess

community preference regarding proportionate variations in energy source shares that used a revealed preference system depending on references-dependent preference.

Earlier research that only looked at the difference between any attribute level as well as the reference point in a revealed preference paradigm should only be used to characteristics with the same preferences orientation in this procedure. For characteristics having a different preference orientation, including such alternative energy sources, however, each respondent's unique parameter must be drawn out. As a result, the first step in this research was to determine individual heterogeneity across discrete choice models using a generic mixed logit model. In the second phase, this research used a mixed logit model to evaluate the preferences for renewable energy sources by choice route but instead non-preferred direction, taking into account reference-dependent preferences.

Furthermore, this same Hierarchy Bayesian (HB) log it model was used to see whether respondents' demographics reflected in any preference variances upon that amount of voltage service features, such as the kind of energy source. Finally, respondent who preferred the adoption of alternative energy resources and high education qualification were extra susceptible towards the development of alternative energy resources, according to this research. Those who did not favour the adoption of alternative energy resources were far more susceptible towards the development of alternative energy sources than those who were satisfied with their existing power services.

Literature Review

Several prior researchers have identified government policies as a key element in encouraging domestic energy resources and influencing the energy mixes. In the literature reviews concerning energy system transformation, there are examples of using various political tools to alter the diffusion and development level of energy sources. These studies looked at the government's involvement in creating new energy sources, establishing a new electricity production, and encouraging utility development. According to Koster and Anderies, successful energy systems transition, like altering the energy systems or expanding alternative energy sources, could be accomplished *via* technical advancements and optimum energy policies that take into account societal issues.

Team of experts investigated the Chinese government's possible involvement in supporting different renewable energy sources. The authors noted that, stressing the administration's position as a supporter of renewable energies, establishing the connections amongst diverse public and policies acceptability was critical to the renewable energy manufacturing's development. Wustenhagen and colleagues also assessed research that looked at societal acceptability of renewable energy technologies. The authors discovered that public knowledge of sustainable power had such a significant impact on people's acceptance and preferences of different energy resources.

According to certain research, popular acceptability and confidence in administration have the important influence on the energy policy achievement. According to Cavallaro and Ciruolo, public acceptability was a critical element in the development of novel energy resources. The scientists determined the utmost optimal kind of wind energy facility by taking into account community acceptability, surrounding topography, and inhabitants' energy status. The inhabitants chose to build a wind energy facility further enough from of the island's visitor attractions, despite the fact that it cost somewhat more. These

conclusions compared with universal government strategies aimed primarily at lowering energy prices, indicating that a thorough examination of the public's preferences and acceptability was required.

Many prior researchers have looked at the people's support of government policies and renewable sources. These researches discovered that the community favoured renewable energy over conventional energy resources such as conventional fossil fuels energy by comparing respondents' preferences in different electrical providers. In South Korea, several studies have looked at the public's desire for and acceptance of energy services. To assess the socially acceptable cost of utility facility sites, Jang used a discrete choice experiment and a Bayesian Hierarchical nested log it models. The findings revealed that nuclear energy had the greatest social acceptability cost, implying that the government will have to spend the most to improve public approval, although the price of renewable energy sources was comparatively less. Team of expert used a generalized linear mixed model to examine public preferences as well as acceptance of various energy providers, and found that renewable energies were the most popular. The aforementioned research used econometric techniques to make direct estimates to examine public attitudes as well as acceptability of energy sources, as well as how government actions affected them. Even though these studies are useful for identifying possible public preferences and proposing policy recommendations based on such assessments, they give little insight into the segment that opposes renewable energy development. Asymmetric objectives of the plan that includes reference-dependent preference may be used to address these constraints. When respondents are split into something like a favoured and non-preferred group, different marginal productivity parameters are achieved for a modification in the same characteristic, according to research that use a similar approach to this study. When considering the absolute number of marginal benefit, this is well known that the non-preferential path has a higher marginal utility value than the preference route:

- Is the amount of individuals who support renewable sources of energy sufficient to keep renewables growing?
- What is the amount of non-preferences of something like the collective which favours the advancement of renewable resources to a great extent of preference of the gang that chooses the advancement of alternative energy resources if there are noteworthy percentages of participants that do not tend to favour the advancement of alternative energy resources?
- Will the policies of increasing the percentage of renewable energy resources still be defensible, given the population of participants as well as the marginal product including both preferences as well as non-preferences group for renewable energy resources?
- What factors influence the respondents' preferences for the growth of alternative energy sources in each group?

To address these issues, this research examines consumer preferences for renewable energy resources using both a HB and mixed log it models that takes into account references-dependent preferences.

Methodology

Design

In the first stage, this research used the universal mixed log it model to analyse the data; in the second step, that study was utilizing

the HB log it model to investigate the variations in the public's preferences for electrical service characteristics. It is, in particular, a modified form of expressing the utility gained by the respondent n by selecting alternatives to indicate how the information of survey is represented in efficacy functions.

The survey was performed with 400 individuals (aged 21-60 years) throughout the major housing regions with the greatest populace to reflect the entire public's preferences and knowledge of the energy services. The interviews were chosen by means of quota-based probability sampling. The samples were allocated specifically based on the characteristics of the population, including such gender, age, as well as the percentages of the residential area.

There are two sections to the questionnaire used in this research. The first section looks at the respondent's perceptions and use of electrical services by asking them the following questions:

- The level of enthusiasm for the energy service,
- The level of customer satisfaction with energy supplies,
- The significance of each element in the provision of energy.

Sample

The discrete choice experiment, also known as conjoint analysis, was employed in this research to gather data on the public's approval of electrical supply, with the kind of energy sources. Respondents in a discrete choice experiments using the stated preferences method are given hypothetical options with varying degrees of the objective's characteristics, and they must select the optimal main objective is to maximize overall utility. In this scenario, relying only on presently available data to determine public awareness has limits. As a result, the revealed preference experiment, which provides respondents with different sets of electrical service characteristics in a comparable environment and asks them to choose one, is seen to be a suitable method for determining public preferences as well as acceptability of electric utility [4].

Data collection

Reference-dependent preferences are taken into account in a mixed log it model: The figures from the aforementioned discrete choice experiments were analysed using the discrete choice model in this research. More significantly, this research used the mixed log it model, which can account for variability in respondent preferences, allowing it to pinpoint an individual's preference for each characteristic. The random utility theory underpins the mixed log it model [5].

$$U_{nj} = V_{nj} + \epsilon_{nj} = \beta_n' X_k + \epsilon_{nj}, \beta_{nk} \sim N(b, W)$$

A responder n 's utility (U_{nj}) may be split into a deterministic component (V_{nj}) and a stochastic term (ϵ_{nj}) that represents uncertainty in the random utility model, that is represented as Equation (1). The deterministic term is calculated by multiplying the vector (X_k), which represents the attribute of the alternative (j) that influences participant's utility, by the coefficient vector (β_k), which represents the value given to respectively characteristic of the alternate. The deterministic phrase mentions to product characteristics that can be explained. The stochastic word, on the other hand, refers to the product's unexplained and unobservable characteristics, like the participant's individual characteristics. The shape of discrete choice model is determined by the distribution hypothesis for stochastic factor. The deterministic component in this research was supposed to

be (NbW) β_k , while the stochastic term was assumed to follow the I.I.D. (Independent and Identically Distributed) type I extreme value distribution [6].

Reference-dependent preferences are taken into account in a HB log it model: Following the identification of the respondents' preferences, the HB model was used to investigate how preferences for electrical service qualities differ based on the participant's characteristic. The HB model creates a unique coefficient vector (β_k) for each participant to reflect their preferences for each characteristic. The person's coefficient represent the distinctions amongst the participants, also each participant's utility is designated likewise to Equation as follows in further detail [7]:

$$\beta_{nk} = \Gamma z_n + \zeta_n, \zeta_n \sim N(0, \Sigma)$$

In the above-mentioned Equation, $z_n \rightarrow$ vector (respondent's characteristics) (n) \rightarrow matrix coefficient (z_n), $N \rightarrow$ stochastic term (respondent's unnoticed changes) and is the covariance between the partial values.

Data analysis

Mixed logit model estimation result: The generic mixed logit model was used in the initial stage of the analysis in this research. The findings indicate that when the proportion of nuclear and coal-fired electricity that poses a danger to the environment grows, the preference decreases. As a result, the people did not want to increase the proportion of fossil and nuclear fuel energies in total energy resources, whereas they chose to increase shares of renewable energy sources. Consumers prioritized environmental preservation and were aware of the possibility for hazards and air pollution associated with various energy sources, according to these findings [8].

The people favoured fewer blackouts, shorter blackouts, and lower power costs, according to the coefficients of these characteristics. The public favoured utility firms to embrace novel technologies like smart meters as well as vigorously engage in social influence events, and the positive indication of these characteristics indicated that customers were ready to accept new technology. Consumer might be conscious of the potential damage that energy companies could cause and desired that all these enterprises recompense consumers, as seen by the favourable correlation for the utilities industry's vibrant social contributions. The proportions of participants that favoured each kind of energy resources were determined in this research, which focused on the type of energy sources.

The aged and family revenue estimates just weren't economically meaningful, showing that interviewees' wealth and ages seemed to have no impact on their selection of alternative energy resources. Nevertheless, the percentage of female participants indicated they didn't endorse sustainable power was higher than the percentage who have said they supported. This research separated respondents' attitudes for renewable energy sources into preferences and non-preferences directions to inspect the degree of direction between them. Such higher losses dislike parameters may suggest that individuals who lean toward the non-preference direction are more probable to oppose renewable energies development than those who lean toward the preference way.

The loss aversion parameter shows that individuals that did not favour the growth of renewables had approximately twice as much faith in their choice as those who did. As a result, increasing sustainable power while factoring for the loss aversion element might

not even increase customer acceptability as quickly as the overall mix log it result implies. The proportion demonstrates that Korean respondents choose renewable energy on average, regardless of the idea of utility or majority rule that is the procedure of explaining individual decisions within a society.

HB log it model estimation result

In addition, this research utilized the HB log it models and ran examination to look at the disparities in the community's preference for various aspects of energy delivery. The model included reference-dependent preference for renewable energy resources, similar to the advanced mixed logit models employed above. As a consequence, while concentrating on respondent characteristics factors, this research discovered the following findings. The findings of the public's desire for growing the proportion of renewable energies in the energy mixes, which is the study's main topic, are examined first. First, if participants didn't select a renewable resource and were satisfied with their current power supply, respondents are especially susceptible to an expansion in the share of alternative energy resources.

This implies that customers who are satisfied with the current quo don't need any modifications to energy mixes implemented. Next, people with higher education levels and a preference for alternative energy sources were known to the growth of alternative energy sources. Such findings were in line with earlier research that suggested that teaching have a substantial impact on WTP and preference for energy resources, regarding alternative energy sources. As previously stated, any changes in renewable energy share will have an impact on more type of energy resources like nuclear and coal-fired energy production. As a result, a discussion of the public's preferences for variations in proportion of coal-fired and nuclear energy production must be involved in people's preferences for renewable energy policy.

As a result, as respondents' education levels increased, they were more concerned about fossil and nuclear fuels energy growth. In the instance of the extra electricity bills feature, as participants' opinions of significance of electric bill rose, people were much more disposed to support a higher share of nuclear power. To put it another way, these participants were found to be least knowledgeable to nuclear energy growth. This result may suggest that customers who are concerned about rising power bills are aware of how effectual and cost-effective nuclear energy is in comparison to other alternative resources. Many previous studies have examined the significance of the electricity bill and energy source to demonstrate that customers' attitudes toward environmentally friendly energy sources have a negative connection with the quantity of the electricity bills. People were minimal sensitive to GHGs emissions or eco-friendly impacts when their energy bills rose, according to several researches.

Additionally, throughout the context of societal issues, the higher the respondents' social problem interest, the further vulnerable they were to nuclear energy development. This result may reflect increasing public opposition to the building of additional nuclear power facilities. That's because the Fukushima Daiichi nuclear catastrophe, which heightened people's fear of an unreliable energy source, societal concerns regarding nuclear energy's stability have been increasing. Finally, the following is the explanation of the study in terms of characteristics other than the kind of energy source: The length of each blackout was increasingly sensitive to the respondent's happiness with the electrical service as their satisfaction with the service increased.

To put it another way, once participants were satisfied with their existing 'energy service, they were more bothered by lengthier outages than the typical customer. Simply stated, customers who were pleased with and liked the current electrical service were more resistant than that of the typical consumer to almost any changes that could disrupt the energy supply based on these two characteristics. In other words, those who were engaged in social problems relating to energy sources as well as government actions were more tolerant of a rise in the power cost than those that are not.

Furthermore, the higher the respondents' involvement in social and economic issues, the less sensitive they were to the increased energy cost. This result is in line with earlier research, which found those individuals who care about societal problems like environmental protection or danger of nuclear disasters are ready to recompense extra for perhaps an alternative resource. Consumers who placed a higher priority on "electric bills significance" were considered to be extra important to increased scheduled energy cost, as anticipated.

Discussion

The findings have important implications for government strategy on renewable energy development. More is, there's a very little study that analyses public acceptance of comparative alterations in energy source shares while taking into account the reference-dependent impact. As a result, this study examined differences in preferences for proportional improvements in renewable energy source proportions, taking current energy source shares into consideration. Depending on the majority's psychographic and demographic attributes, the research whereupon collected distinct preferences just on source of energy possible cause and electric utility facility qualities to much more precisely investigate general populace recognition of the growth of alternative energy sources relying on the approximate preferences [9].

Populace approval of administration strategies to upsurge the proportion of renewable energy sources may be regarded as relatively large based on study's analytical findings. The findings show that respondents who favoured renewable energy sources as well as have advanced levels of education were extra susceptible to an increase in renewable energy source share. Furthermore, the participants who didn't embrace renewable energy sources were additionally susceptible to the growth of renewable energy resources if their electrical service satisfaction was high. In this regard, it was discovered that the higher the significance of the power bill to the respondents, the less susceptible they were to the development of nuclear energy; the more concerned they were about societal problems, greater susceptible individuals were to nuclear energy growth [10].

Conclusion

The public, understandably, depends on existing energy source shares before deciding on personal preference for state intervention to alter those shares. More significantly, a government seeking to increase renewable energy sources must carefully evaluate public approval and stick to its objectives, rather than increasing renewable energy sources indiscriminately. In this case, analysing the asymmetry in public opinions on alternative energy sources would be feasible by utilizing extensively studied public acceptance on policy as well as integrating the reference-dependent objective functions in the renewable energy source attribute.

To summarize, the government must seek incremental power price increases while simultaneously considering public acceptability in

order to decrease the proportion of nuclear power generation and raise the penetration of renewable energy. That is, the administration must develop a long-term strategy to reduce the use of nuclear and fossil energy whilst maintaining the acceptability of alternative energy sources by maintaining reasonable power prices. Furthermore, a thorough study of respondents' interests as well as demographics revealed that respondents' degree of interest in social problems influenced their choice for nuclear power generation, which would be linked to renewable sources of energy.

As a result, in order to increase general populace engagement in the oil and gas sector, energy authorities should encourage diverse methods that take into account the diversity of preferences. For example, by continuing to host the current public discussion on nuclear power generation as well as publicizing the benefits and drawbacks of renewable energy, the public's knowledge as well as acceptance of sustainable power may grow. It is anticipated that if these kinds of promotional efforts are utilized as part of public energy education, including energy policy, public approval of government climate change policy would increase.

References

1. Kusch Brandt S (2020) Underutilised Resources in Urban Environments. *Res* 9: 38.
2. Kim J, Park J, Kim H, Heo E (2012) Assessment of Korean customers' willingness to pay with RPS. *Renew Sustain Energy Rev* 16:695-703.
3. Priem F, Canters F (2021) Modelling transitions in sealed surface cover fraction with Quantitative State Cellular Automata. *Landscape Urban Planning* 211: 104081.
4. Dellavigna S (2009) Psychology and economics: Evidence from the field. *J Econ Lit* 47: 315-372.
5. Koster AM, Anderies JM (2013) Institutional factors that determine energy transitions: A comparative case study approach. *Lect Notes Energy* 23: 33-61.
6. Peidong Z, Yanli Y, Jin S, Yonghong Z, Lisheng W, et al. (2009) Opportunities and challenges for renewable energy policy in China. *Renew Sustain Energy Rev* 13: 439-449.
7. Wustenhagen R, Wolsink M, B urer MJ (2007) Social acceptance of renewable energy innovation: An introduction to the concept. *Energy Policy* 35: 2683-2691.
8. Cavallaro F, Ciralo L (2005) A multicriteria approach to evaluate wind energy plants on an Italian island. *Energy Policy* 33: 235-244.
9. Raza A, Chandio SM, Ali NI, Solangi Z, Shah A, et al. (2018) Analysis determinants of social media acceptance in higher educational institutes of Pakistan. *Int J Eng Technol* 7: 32-36.
10. Ko S, Kim W, Shin SC, Shin J (2020) The economic value of sustainable recycling and waste management policies: The case of a waste management crisis in South Korea. *Waste Manag* 104: 220-227.