

STRATEGY DESIGN TO INCENTIVIZE THE EFFICIENT USE OF ENERGY IN THE HOTEL INDUSTRY ON THE ISLAND OF TENERIFE

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Overview

Energy consumption is strongly linked to the development and economic activity and serves as an indicator, among others, for the degree of development of a country or region. However, greenhouse gas emissions from energy production and use have a considerable weight in the current debate on the effects of climate change. Reducing energy consumption leads to reduced emissions through the use of non-polluting energies and improved Energy Efficiency (EE), thus mitigating the effects of climate change. Energy planning in each country is a necessary instrument to achieve the emissions reduction targets proposed by the European Union (EU). In response, Spain has developed the National Integrated Energy and Climate Plan (PNIEC). Likewise, the Canarian government is in process of elaborating the Canary Islands Energy Transition Plan (PTECan) which is expected to be put in practice at the end of 2021. However, in the case of the Canarian economy, energy planning and regulation is complicated as it is characterized by presenting a number of singularities derived from its island status and its remoteness from the national territory and sources of supply. Furthermore, the economy of the Canary Islands is highly dependent on tourism. This economic sector is the one that contributes the most to GDP (34%) and employment in the Canary Archipelago. The above mentioned facts led us to the main objective of our research. Hence, the aim of this study is to propose strategies for reduction of energy consumption and the introduction of renewable energy sources in the hotel industry on the island of Tenerife. Energy efficiency policies for hotel establishments will be proposed based on the viewpoints of stakeholders involved in the public and private energy and hotel sectors.

Method

The mixed “*qualiquantological*” Q method was applied in order to identify the different perspectives of local energy and hotel stakeholders. Q methodology is a hybrid method whose objective is to obtain the subjective opinions of a group of people (P-set) on a specific topic to determine the different viewpoints on it. It consists of surveying experts who represent the different stakeholders involved in a problem by asking the degree of agreement on different aspects of the issue (Stenner & Stainton Rogers, 2004). The Q survey could be performed by face-to-face interviews, online surveys, or a combination of both. This comprises the qualitative part of the method. The quantitative part entails statistical factor analysis of the participants’ sets of responses (Q-sorts). Subsequently, from this information specific strategies or policy measures that integrate the different standpoints can be designed. Q methodology aims to depict stakeholders’ opinions on a controversial issue in order to categorize and cluster them in different groups (factors) sharing a similar way of thinking. In the case of determining strategies for boosting energy efficiency in the hotel industry, Q methodology is the most adequate, since the political and subjective element, results in quantitative factors. The results of our study will be based on the viewpoints and technical knowledge of a set of experts (P-set). This feature makes it easy to classify, confront and weigh energy efficiency issues. Therefore, studying the perspectives of a trained group means a greater understanding of the Canary context and also of its shortcomings and opportunities. Q method is a powerful tool which provides a thorough view of governance and energy policy that cannot be easily defined by other purely quantitative methods. Moreover, the sampled group of participants in other approaches is randomly selected and generally lack the training and experience in the sector, which is a key factor for our study.

Results

Q methodology is performed in several phases:

In the first stage, data was obtained which allowed us to know the different viewpoints that exist on energy efficiency aimed at the decarbonization of the hotel industry. It consisted in collecting a population of opinion statements, called a *concourse* (Deubel & Gamboa, 2014). This process is based on the hypothesis that on any subject there exists a finite number of views. This population of statements was gathered from scientific journals, professional literature, in-person interviews, congresses, press articles, academic social networks and other sources of information relevant to the subject. The *concourse* was considered to cover all aspects of the research question.

These statements were organized into three thematic blocks. Block 1: General measures, taxation and awareness; Block 2: Air conditioning and sanitary hot water saving measures and Block 3: Energy efficiency measures. Moreover, Block 1 additionally asks experts to state their opinions regarding specific statements related to the current COVID-19 pandemic and energy efficiency issues. Subsequently, a pilot survey was then tested with 3 experts in electrical engineering and renewable energy, 1 expert in sanitary hot water, solar thermal energy and maintenance of hotel facilities and 1 expert from the Technological and Renewable Energies Institute of Tenerife, specialized in photovoltaic energy. All five specialists suggested changes and gave useful insights on how to improve the questionnaire. Finally, a sample of 30 statements called a *Q-set* was selected for our study.

The second stage involves the selection of survey participants, who are not chosen at random as in other types of surveys. Experts were selected from all sectors involved in energy and hotel issues. This expert group is called a *P-set* and the number of participants may vary between 25 and 40 (Brown, 1993). Q Methodology is not intended to extrapolate the results of a sample to the entire population, but to extract the opinion only from the experts. For this reason, the sample of participants in such studies is small. In our case it will depend on the respondents' rate of the already preselected group of experts. Once the P-set was built, participants must sort the statements by rank-ordering their opinions in a range of +4 (totally agree) to -4 (totally disagree). This process is called Q-sorting and follows a quasi-normal distribution determined by the researcher where a limited number of opinions are allowed to be placed in the "agree", "neutral" and "disagree" columns (Ehlert & Orr, 2019). The interviews are going to be held in person, and the specific software used for completion of the survey is "Lloyd's Q Sort Tool".

After having conducted the survey (Q-sorting), the third phase of the Q method will be performed, namely a statistical processing of the data by means of "Inverse" Factor Analysis. For this purpose, a specialized software (Ken-Q) will be used. Unlike conventional factor analysis, where the goal is to reduce the number of variables in factors, "inverse" factor analysis uses the transposed correlation matrix and groups individuals instead of grouping variables (Frate et al., 2019). The type of factor analysis to be used is the Principal Components Analysis (PCA) with a varimax orthogonal rotation that is predefined by the statistical software to extract the significant factors and calculate the z-values of the statements in each factor. Factor loadings (z-values) indicate the correlation between the factor and the variable, and ideally each variable would load high at one factor and low on the others. Factors are formed with energy experts who share similar opinions. In addition, according to the results, "consensus" statements and "distinctive" statements could be observed (Brown, 1993). "Consensus" statements have similar z-values among all factors, while "distinctive" statements have the highest z-values in a given factor.

Conclusions

The results of this work will identify different sensitivities regarding possible ways of addressing energy saving and usage in the hotel industry on the island of Tenerife. On the one hand, this information could be used to propose general measures (taxation, subsidies, etc.) and on the other hand, it would also be helpful to suggest measures of a specific nature. From the results based on experts' opinions we would contribute to design a strategy of energy governance on the Canary Islands. Furthermore, our research would provide an overview on stakeholders' opinions regarding energy saving strategies in a hotel industry affected by COVID restrictions. The change in tourists' behavior affected by the current pandemic is an important factor to be considered by hospitality stakeholders and should be taken into consideration in their strategies to improve energy efficiency.

References

- Brown, S. R. (1993). A Primer on Q Methodology. <https://search.datacite.org/works/10.15133/j.os.1993.002>.
- Deubel, A. R., & Gamboa, E. B. (2014). Q Methodology: an alternative for participation in the reform of higher education policy in Columbia. *Ciencia Política*, 9(18), 237-264.
- Ehlert, K. M., & Orr, M. K. Comparing Grouping Results Between Cluster Analysis and Q-Methodology. Paper presented at the 1-3. <https://doi.org/10.1109/FIE43999.2019.9028444> <https://ieeexplore.ieee.org/document/9028444>.
- Frate, C. A., Brannstrom, C., de Morais, Marcus Vinícius Girão, & Caldeira-Pires, A. d. A. (2019). Procedural and distributive justice inform subjectivity regarding wind power: A case from Rio Grande do Norte, Brazil. *Energy Policy*, 132, 185-195. <https://doi.org/10.1016/j.enpol.2019.05.027>.
- Stenner, P., & Stainton Rogers, R. (2004). Q methodology and qualiquantology: the example of discriminating between emotions. Psychology Press.