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Satisfaction with Media Information about Renewable Energy Investments

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Abstract: The strong influence of the media could be leveraged for increasing investments in renewable energy sources (RES), which, in turn, assist the transition to a low-carbon energy system that aligns with renewable energy targets. However, it is not known whether media information facilitates citizens interested in investing. Hence, the aim of this study is to support the decision-making of citizens by improving media information about renewable energy investments. Specific objectives are to measure citizen satisfaction with media information about RES investments and to detect the areas that require immediate attention. To that end, 1536 Greek citizens recruited with simple random sampling were administered structured questionnaires and, to analyze citizen satisfaction, multiple criteria satisfaction analysis was applied. According to results, citizens were not satisfied with media information about RES investments, while the lowest satisfaction was recorded for information about available subsidies for RES investments, as well as changes in the institutional framework. This finding has potentially important implications as inadequate information about investments may prevent interested citizens from investing. Given that investment schemes undergo constant changes and that journalists may not be experts in investments, it is recommended to tailor information to citizens' understanding and that academics and experts provide the media with simplified information material about RES investments.

Keywords: renewable energy; energy transition; media coverage of renewable energy; media satisfaction; investments in renewable energy; citizen investment; multiple criteria satisfaction analysis

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1. Introduction

Social factors are inextricably linked to energy transition and should be understood if any progress towards renewable energy is to be achieved. In specific, there is robust evidence showing that personal environmental attitudes affect individuals in terms of energy behavior and choices and, for this reason, scholars have directed considerable research towards individuals' attitudes, while a prominent theme in the relevant literature concerns individuals' willingness to accept or adopt renewable technology [1,2].

Investing in renewable energy is a direct way in which citizens can facilitate energy transition. Through their participation in various investment schemes, citizens can become providers of an appreciable part of the necessary capital for the deployment of renewables. Having invested in various feed-in-tariff schemes, citizens in some EU countries already own a substantial share of renewable energy production and, by doing so, have contributed to their country's energy transition [3]. The potential role of citizens in driving energy transition highlights the importance of conducting more research in order to understand citizens' decision-making. Most literature on the subject has focused on whether and to what extent investment decisions are affected by several factors, such as sociodemographic,

financial, and non-financial variables. Among non-financial variables, the level of information that individuals have about RES investments has been found to affect decisions. In particular, citizens, who are adequately informed about RES investments are markedly more likely to invest compared to those who are less informed [4,5]. Media information is, therefore, likely to affect the decision-making of citizens, who, being less experienced in investments compared to professional investors, resort to the media in order to obtain information about available investment schemes. As media information may affect RES investments much more than it is often considered, the adequacy of media information about RES investments turns into a key matter that calls for more research [2,6,7].

In view of the above, it seems worthwhile to examine whether the provided information meets citizens' expectations and needs. As the media have developed to the degree of exhibiting similar characteristics with purchasable products, it is necessary to examine media satisfaction, that is, satisfaction with the media's service of providing information [8]. To that end, multiple criteria satisfaction analysis may be particularly useful because it can not only measure satisfaction, but also detect areas of underperformance that require improvement. If current underperformance is addressed and topics on RES investments are covered in ways that meet citizens' expectations, it is reasonable to expect that more citizens will proceed to investments. If, however, media information is inadequate, then willingness-to-invest may not be translated into actual investments and significant benefits flowing from citizen investments may not be leveraged. Hence, the aim of this research is to support the decision-making of citizens interested in investing in renewables by improving media information about renewable energy investments. Specific objectives are to measure citizen satisfaction with the media's information about RES investments and to detect the areas that require improvement.

The examination of media satisfaction may make important contributions. Most importantly, the media may be covering topics on RES investments, but it is possible that this coverage does not effectively communicate the available investment schemes or that coverage may not be tailored to citizens' understanding. In this respect, a satisfaction analysis, as the one reported in this work, may be helpful in pointing to weaknesses that require improvement and, if improved, may facilitate citizens to invest in renewable energy. In other words, a lot could be gained if media information would be improved to the degree of becoming an updated and simplified resource at the disposal of citizens interested in RES investments who have neither the experience nor the knowledge of professional investors.

The remaining of the paper is structured as follows. Section 2 provides the theoretical background of the study by discussing the existing knowledge regarding the influence of the media, the impacts of framing, and media satisfaction. Then, Section 3 describes the methodology followed to perform this study and, specifically, it provides information on the study area, sample size, sampling method, and data analysis. Section 4 reports results in detail and Section 5 discusses results by interpreting them in relation to existing knowledge as well as to the existing situation. Finally, conclusions are reached in Section 6 and all literature sources cited in this paper are given in the References section.

2. Theoretical Background

In any kind of change or problem that requires policy response, citizens and laypeople play a critical role as they can either accept or reject proposed courses of action. In an attempt to discover what underlies acceptance and rejection, researchers found long ago that citizen attitudes are greatly affected by the media, which often give more salience to certain angles of a matter than others [9–11]. However, this does not necessarily mean that the media are the only factor that shapes attitudes. It rather seems that attitudes are embedded in long-standing cultural and ideological identities, but formed by various influences and information sources, of which the media exerts a central effect [12].

Most discussions on the influence of the media revolve around framing, which is the practice of highlighting specific aspects of a matter which, in turn, may manipulate individuals' understanding of the matter and even shape dominant perceptions [13,14].

There are two main ways in which the media affects public opinion; the first refers to cases where the media controls which stories are covered extensively or report specific perspectives of stories [12], while the second way occurs when the media draws upon press releases, events, and issues in order to create appealing stories, whose framing affects public debates on covered topics [12]. As a result of framing, media stories can deviate to a varying degree from objective reality [15]. At the same time, the media has been criticized for using tailored messaging to reproduce the most prevailing aspects of reality rather than reality itself [16]. This can have far-reaching effects if one considers that public opinion affects political decisions [17].

The intricacies involved in the formation of public opinion and the role of the media in it are also reflected in energy transition, which encompasses much more than economic and technical capabilities, and is reliant on public support to be achieved [18,19]. In an effort to understand how the public perceives and responds to renewable energy, researchers have pointed out the need to pay more attention to media discourse around renewables [20]. It has been observed that the media's framing of new energy technologies can radically affect how the public perceives them and even reinforce or decrease social acceptance [12,21]. Accepting renewable energies often requires some level of familiarity with them, but as large-scale RES facilities are not easily accessible, media platforms can be the only way to familiarize the public with new technology plants [22]. This does not mean that the media is actively trying to familiarize the public with renewable energy, but their coverage of renewables may be more influential than assumed. Scholars have argued that the media's engagement in providing information about renewable energy is rather poor and most initiatives seeking to raise awareness or address concerns are one-way information provisions [23]. What is even more concerning, however, is that media reports may sometimes exaggerate potential risks posed by renewable energy installations. For instance, the adverse visual and audio impacts of renewable facilities on natural landscapes have become central topics of media coverage [24]. Moreover, when the media is strongly involved in the installation of local renewable projects, existing tensions between authorities and opposing groups, such as residents and ecologists, may be exacerbated [24]. It can also become problematic when the media adjusts scientific and technical data to their own objectives and interests [25].

On the other side of the coin, the media is able to promote the use of renewable energy while social media may be emerging as one of the most powerful media platforms. In specific, it was found that householders were more likely to use renewable energy if they used trusted channels, which conveyed messages about the negative effects of conventional energy sources, as well as the low cost of renewables [2]. However, the media's framing of renewable energy does not remain the same and, from time to time, its focus can shift from economic and technological aspects to environmental aspects and from negative reports of impacts to positive reports of renewables' environmental benefits [6,7]. An example of such shifts can be provided by Dehler-Holland et al. [26], whose analysis of 6654 newspaper articles indicated that media discourse regarding the German Renewable Energy Act is no longer communicating optimistic technological and industry messages, but has shifted its focus mostly on policy costs.

Turning the attention back to the positive effect of information, there is research showing that knowledge and information about renewables can positively affect citizen investments. The need for providing more information about renewable systems was stressed by Vasseur and Kemp [4] who, inter alia, examined the reasons that prevented potential investors from investing in renewables. One of these reasons was that the potential adopters of photovoltaics perceived that there is insufficient information about solar energy and its possibilities. This is in line with Strazzera and Statzu [5], whose findings suggested that information and awareness about the benefits of innovative renewable types, such as Building Integrated Photovoltaic technologies, would enhance their acceptance and perhaps adoption. In addition, a clear understanding of the level of difficulty with which a solar system is installed is often a parameter that affects homeowners and makes them

quite skeptical about possible damages to their property. The willingness to adopt such systems is positively affected by their easy application [4].

In view of the above discussion, it can be argued that a lot of effort is required to ensure that the media fulfills the crucial purpose of informing the public about all aspects of energy transition with objectivity and in ways that serve the public's information needs. To that end, insights into people's satisfaction with the media may reveal the areas of under-performance that require improvement in order to fulfill people's information needs.

Satisfaction is, in general, a key concept in a wide array of disciplines, such as marketing, social psychology, as well as organizational communication [27]. There have been numerous attempts to define satisfaction but, to mention some, satisfaction has been described as an overall emotion of fulfillment that results from repeated exposure to a specific content genre [28]. Oliver [29] had previously observed that expectations are central to satisfaction and, specifically, satisfaction can occur as a consequence when the actual service or product meets expectations. Conversely, if expectations are not met, then dissatisfaction occurs as a consequence of disconfirmation of expectations.

Since the media has developed to the degree of exhibiting similar characteristics with purchasable products, communication scholars have pointed out the need to examine media satisfaction, that is, satisfaction with the media's service of providing information [8]. In other words, media users can be regarded as 'consumers' of media products, because they seem to follow the same behavioral patterns with product customers and, much like satisfied customers, satisfied media users are inclined to use the same media again, as opposed to dissatisfied users who may seek alternatives [30]. In this regard, it makes sense to draw on customer satisfaction methodologies in order to inform research on media satisfaction. The same stream of research has focused on the factors that affect satisfaction with the media. Media satisfaction may encompass a cognitive component as media users evaluate media performance and make judgments before deciding whether they will use the same media again [30]. In addition to cognitive components, media satisfaction is closely linked to individuals' motives in obtaining information about specific topics [30].

It can be seen that most research on media satisfaction examines how individuals use the media or analyzes the behavior of media users, as well as their intention to reuse the same media. Nevertheless, the media can play a key role in environmental issues because the information they provide can have a strong effect on public opinion. Building on the influence of media agendas, there can be no doubt that media information may move public opinion in positive directions. In the setting of renewable energy investments, the provision of satisfactory information could be translated into substantive progress towards the deployment of renewable energies. To that end, multiple criteria satisfaction analysis can not only reveal the current level of satisfaction with the media information about RES investments, but also pinpoint the areas that need to be improved in order to correspond to people's expectations.

3. Materials and Methods

The aim of this research is to support the decision-making of citizens interested in investing in renewables by improving media information about renewable energy investments. The specific objectives are to measure citizen satisfaction with the media's information about RES investments and to detect the areas that require improvement. The study area was Greece and the population under study was all Greek citizens, and the total population of the study area was 10,815,197, according to the national census of 2011. To meet the research objectives, a structured questionnaire was designed based on the findings from the relevant literature (such as the research works of Vasseur and Kemp [4] and Strazzera and Statzu [5]). In the questionnaire, most questions employed five-point Likert-type response scales, which is optimum for analyzing the findings of research based on survey questionnaires [31]. In total, the questionnaire involved 26 closed-ended questions.

To verify that the questionnaire was able to provide precise and coherent results, a pilot study was conducted on a limited scale before the performance of the actual study [31].

In addition, the pilot study, which must have the same characteristics and follow the same steps as the actual study, helps researchers to discover the strong and weak points of the questionnaire. In other words, the research instrument is put to the test in order to make improvements where it is necessary. In our questionnaire, a few phrases in the items were reworded as they were not understood by all pilot study participants. In addition, the response scale for one item had to change to facilitate the responses of participants and the order of three items had to be re-arranged to ensure the coherence of the questionnaire and to avoid confusion among respondents.

Adhering to the provisions of Article 23 of Law 4521/2018, the Research Ethics Committee of the Democritus University of Thrace (Decision No. 3/09-12-2019) granted a permit to this research.

3.1. Sampling

In order to achieve a representative sample of citizens, simple random sampling was the sampling method that was followed. In order to estimate the sample size, it was necessary to first carry out pre-sampling with a sample of 50 respondents. For every variable, therefore, the actual analogy of the population was estimated. The use of questionnaires in research is not limited to the estimation of only one variable, but of more variables. For this reason, it was necessary to estimate the sample size for each variable. 'Gender' was the variable that gave the highest sample size. If the estimated sample sizes are close and do not differ significantly and also fall within the economic ability of the research, then the highest sample size is chosen. By doing so, the variable exhibiting the highest variability is estimated with accuracy, and the remaining variables are estimated with a higher level of precision [32].

The above method provided information about the analogy of the sample and the formula of simple random sampling was then used to estimate the sample size. The application of the formula showed that 1536 citizens had to participate in this study [33]. To avoid incomplete answers and to ensure that all items were understood, all questionnaires were completed through personal interviews. A more detailed description of the methodology that was followed to perform the study can be found in a previous publication [33].

3.2. Data Analysis

Once questionnaires were collected, the data were coded in Excel and inserted into the Statistical Package for the Social Sciences (SPSS). The questionnaire involved a multivariate question examining citizens' satisfaction with the media's information about renewable energy investments, which was particularly constructed for analysis with the MUlticriteria Satisfaction Analysis (MUSA) method. As a multiple criteria decision approach, the MUSA method is in line with the principles of ordinal regression [34–36]. The method yields estimated weights and average satisfaction indices for each of the examined criteria. In addition, the estimated weights stand for the criteria's relative importance in overall satisfaction. Moreover, estimated weights take a form that is relative, and the sum of weights (and sub-weights) is 1. The index of average satisfaction shows the level of citizen satisfaction for every criterion as well as sub-criterion in a 0–100 range. Estimated weights may be regarded as importance indices, while average indices of satisfaction can be considered performance indicators [34,36].

The main advantage of the MUSA method is that it fully considers the qualitative form of customers' judgments and preferences. Specifically, the main input of customer satisfaction surveys is given in an ordinal form and the MUSA method, contrary to other regression-type approaches, does not arbitrarily quantify these ordinal variables. A very useful result of the method is the four quadrant action diagram, which results from combining average satisfaction indices with criteria weights. These diagrams are very practical as they illustrate the strong and weak points of satisfaction. Action diagrams are structured around performance (expressed as high/or low) and importance (expressed as high/or low) and may be used to guide improvement actions (Figure 1). They are also very similar to a

SWOT analysis as they contain leverage opportunity and action quadrants, which indicate strengths and weaknesses, respectively. In addition, the transfer resources and status quo quadrants represent the opportunities and the threats, respectively. It should be noted that the action diagram is, in essence, a type of gap analysis, because it indicates the difference between 'what citizens want' (importance) and 'what citizens receive' (performance).

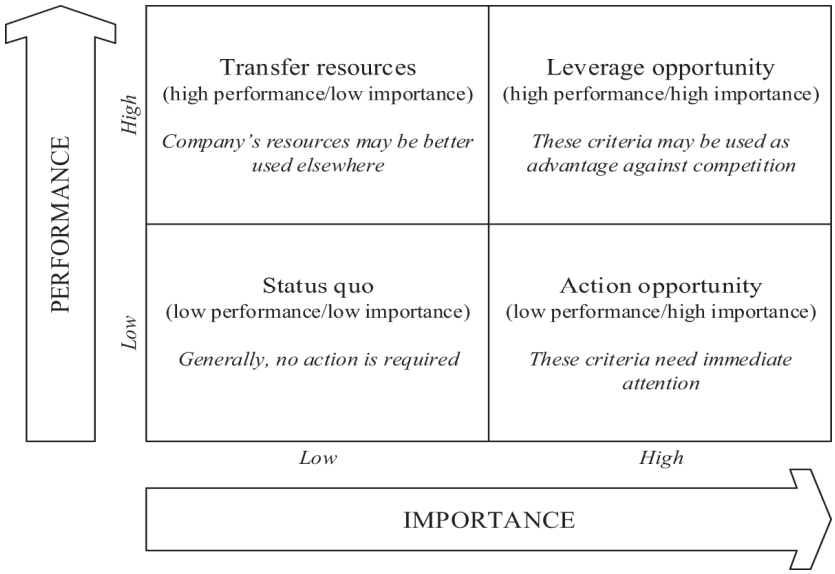

Figure 1. Action diagram (source: Grigoroudis and Siskos [35]).

Apart from action diagrams, the MUSA method also produces improvement diagrams, which also consist of four quadrants and their creation is based on effectiveness (expressed as high or low) and the degree to which citizens are demanding (expressed as high or low) (Figure 2). More analytically, the area of the first priority indicates direct improvement actions. These dimensions are highly effective, and citizens are not demanding. The second priority quadrant involves satisfaction dimensions that have either a low demanding index or a high improvement index. Finally, the third priority quadrant includes satisfaction dimensions, which present a small improvement margin and require considerable effort.

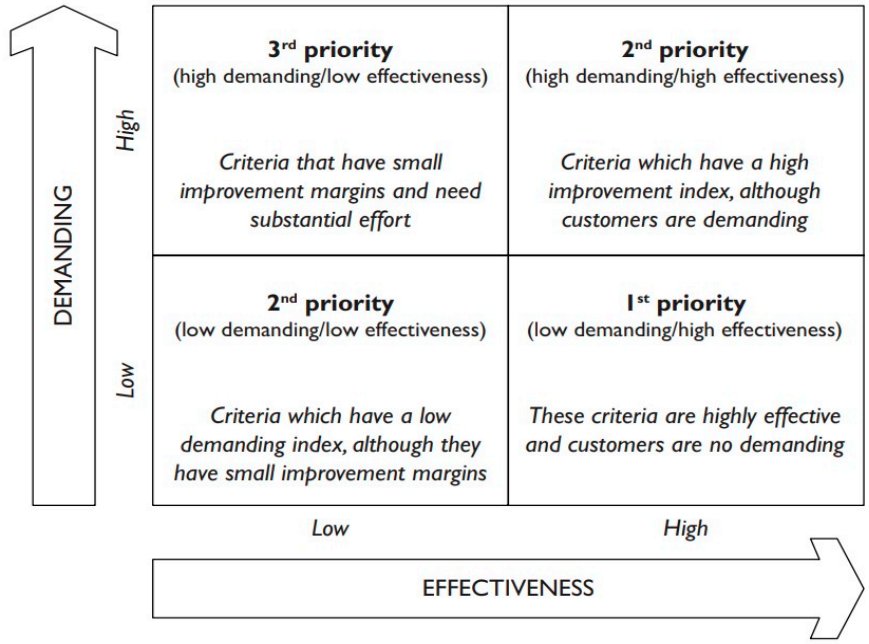

Figure 2. Improvement diagram (source: Grigoroudis and Siskos [35]).

4. Results

4.1. The Sociodemographic Profile of Respondents

Sociodemographic variables collected in this study were gender, age, occupation, education level, marital status, place of residence, and annual income. Women (51.6%) outnumbered slightly their male counterparts, and, with regard to age, a significant share (by 27.9%) was aged 41 to 50 years old, while somewhat lower shares were aged between 31 to 40 years (22.1%), 18 to 30 years (21.9%), and 51 to 60 years (18.3%). In terms of occupation, the percentage of employees in the private and public sectors (21.2% and 19.9%, respectively) was greater in comparison to other occupation categories. More specifically, appreciable percentages of respondents were pensioners (by 16.8%), unemployed (by 13.2%), and freelancers (by 12%). However, only as few as 7.6% of the respondents were involved in crop and livestock farming, which is compatible with official data showing the abandonment of agricultural activities in the past decades.

In terms of education level, university graduates and upper secondary school graduates consisted of 22.3% and 20.8% of the sample, respectively. Regarding respondents' marital status, slightly more than half of the respondents reported being married (51%), and most of these respondents reported having two children (28.3%). With regard to respondents' place of residence, most respondents were urban dwellers (64.1%) and, in terms of annual income, 28.5% reported earning an annual income between 10,001 and 20,000 Euros and 20.1% between 5001 and 10,000 Euros. It should be noted, however, that a considerable percentage of respondents (by 28.8%) did not report their annual income.

Finally, respondents were asked to report the information sources they use in order to obtain information about environmental and energy topics. A significant proportion of citizens reported using often or always news websites (42.1%), websites of official organizations (38%), and television and radio networks (37.8%). The performance of the non-parametric Friedman test showed that news websites were ranked in the first position (mean rank 7.74), followed by television and radio (mean rank 7.62), and websites of official organizations (mean rank 7.30). More details about respondents' sociodemographic characteristics can be found in a previous publication [33].

4.2. The Satisfaction of Greek Citizens with the Media's Information about Investments in Renewable Energy

Citizens' satisfaction with the media in terms of the information they provide on investments in renewable energy was examined. Overall, citizens expressed low levels of satisfaction with the examined actions (Table 1). Even though all variables received low ratings, the lowest satisfaction was observed for information that the media provides about changes in the institutional framework (65%), followed by information on the institutional framework of renewable energy (tax system, national legislation, and integration of European Directives) (64.9%), as well as loan opportunities and investment conditions (63.1%). Somewhat higher satisfaction was observed for the media's information about the economic, environmental, and social advantages of renewable energy (13.8%).

Next, the MUSA method was applied to further analyze citizen satisfaction with the media's information about RES investments. Satisfaction indices provide important insights into citizens' satisfaction with the information that the media provides about different aspects (criteria) of investments in renewable energy. The average global satisfaction is far too low, as it stands at around 15.2%, indicating that citizens are not satisfied with the media in terms of the information they provide about investments in RES. The satisfaction indices for the examined criteria indicate the level of partial satisfaction with each of the examined criteria (Table 2). More analytically, the lowest satisfaction indices were recorded for the criteria that concerned changes in the institutional framework (8.7%), followed by the available subsidies for investments in renewable energy (13.5%) and loan granting and investment conditions (19.2%). Citizens expressed comparably higher satisfaction for the information provided by the media about the economic, environmental, and social advantages of renewable energy (21.8%), as well as the institutional framework of renewable

energy (tax system, national legislation, and integration of European Directives) (22.9%). The value functions were also estimated and are provided in Figure A1 in Appendix A.

Table 1. Percentage units of respondents' satisfaction with the media in terms of the information they provide on RES investments (in %).

	Very Dissatisfied	Dissatisfied	Moderate Satisfaction	Satisfied	Very Satisfied
Institutional framework of renewable energy (tax system, national legislation, and integration of European Directives)	30.9	34.0	27.7	5.9	1.4
Changes in the institutional framework	29.2	35.8	27.9	6.3	0.8
Available subsidies for investments in renewable energy	28.6	32.0	29.0	9.1	1.3
Loan opportunities and investment conditions	30.3	32.8	26.6	8.1	2.1
Economic, environmental, and social advantages of renewable energy	25.1	29.4	31.7	12.0	1.8

Table 2. Criteria weights and average satisfaction, impacts, and demanding indices regarding citizen satisfaction with media information about investments in renewable energy.

Criteria	Weights (%)	Average Satisfaction Indices (%)	Impacts Indices	Demanding Indices
Institutional framework	12.0	22.9	−0.440	−0.627
Changes	33.9	8.7	0.796	0.656
Subsidy	23.2	13.5	0.177	0.332
Loan	15.5	19.2	−0.255	−0.181
Advantages	15.5	21.8	−0.278	−0.181
Overall satisfaction		**15.2**		

The combination of criteria weights and average performance indices was used to develop helpful diagrams that offer useful insights into the survey results. Table 2 presents the weights and indices that were used to build the action and improvements diagrams (Figures 2 and 3).

Action diagrams can be used to enhance the quality of the strategic decision-making process in relation to actions that may contribute to customer satisfaction. It should be noted that action diagrams are relative, and that the weights and indices are normalized around the mean value, taking into account the standard deviation. Based on the action diagram (Figure 3) developed through the combination of performance (satisfaction rating) and importance indices (criterion weight), the following can be observed:

- Analyzing the area of action opportunity (low performance/high importance), the analysis reveals the weaknesses regarding the media's provision of information about RES investments. It can be seen that the criteria located in this quadrant are the criteria concerning the information about the available subsidies for investments in renewable energy along with the changes in the institutional framework. This location means that the media should pay much more attention to these criteria and try to improve them, as they are more important for citizen satisfaction, but citizens are not satisfied with the media's performance on these criteria.
- The remaining criteria are located in the transfer resources quadrant, which expresses high performance and low importance. In particular, the institutional framework of renewable energy (tax system, national legislation, and integration of European Directives), loan granting, and investment conditions, as well as the economic, environ-

mental, and social advantages of renewable energy, are clearly located in this quadrant. This location shows that the media pays attention to and provides more information on criteria that, compared to other criteria, are not as important for citizens. The effort and resources that the media allocates to these criteria should be transferred to criteria that present low satisfaction indices. Namely, resources should be transferred and used for the criteria located in the action opportunity quadrant, which involves criteria concerning the information about the available subsidies for investments in renewable energy and the changes in the institutional framework.

- It is also observed that there are not any criteria in the leverage opportunity quadrant (characterized by high performance/high importance) as well as in the status quo quadrant (characterized by low performance/low importance). Regarding the leverage opportunity quadrant, the absence of criteria implies that there are not any strong points. On the other hand, the status quo quadrant would have pointed to potential critical factors, that is, criteria that do not perform well but are not considered important at present. All these results show that there is a gap in media satisfaction: citizens appear relatively less satisfied with the most important criteria and more satisfied with the least important criteria.

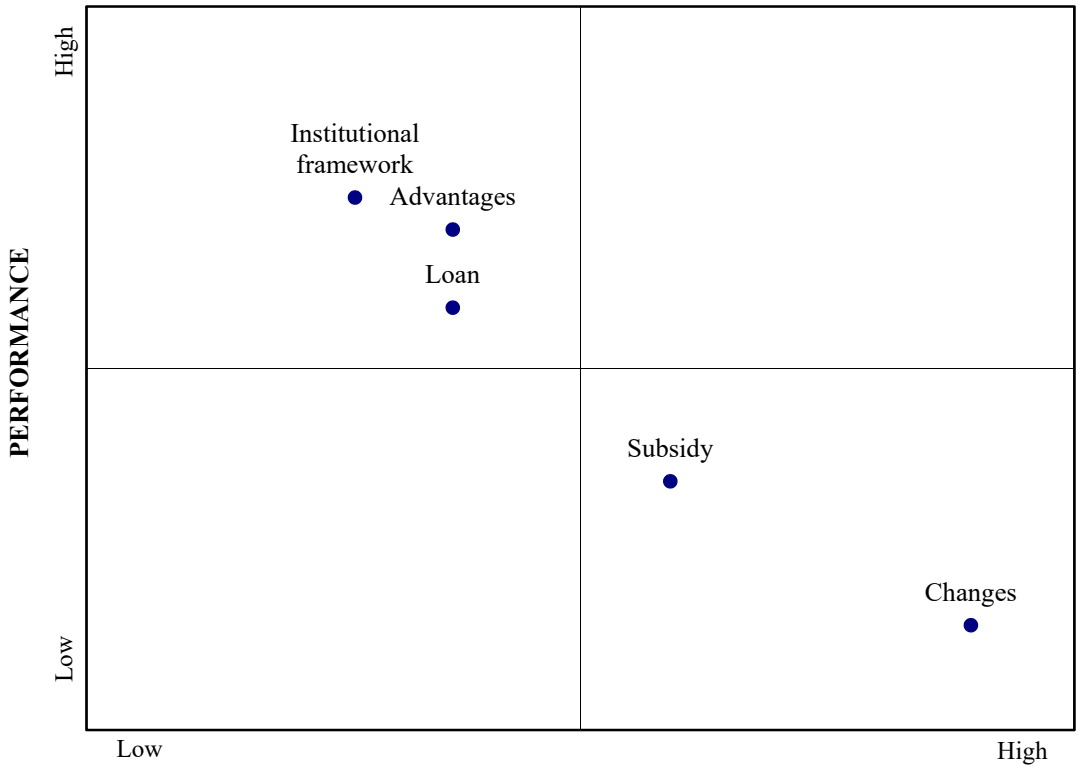

Figure 3. Action diagram: Citizen satisfaction with the media's information on renewable energy investments.

Action diagrams are able to indicate the satisfaction dimensions that require improvement but are not able to show the output or extent of the improvement efforts. This can be determined by the improvement diagrams that can be developed through the combination of improvement and demanding indices. Figure 4 illustrates the improvement diagram, which helps rank improvement priorities. Specifically:

- Available subsidies for investments in renewable energy along with changes in the institutional framework appear in the second priority quadrant, which is characterized by a high level of demanding and high effectiveness. This location means that Greek citizens are demanding in terms of these two criteria; therefore, the media should exert

more efforts in order to improve them. In other words, satisfaction with these criteria will increase only if significant improvement efforts are made.

- Institutional framework of renewable energy (tax system, national legislation, and integration of European Directives), loan granting, investment conditions, and economic as well as environmental and social advantages of renewable energy are located in the second priority quadrant. This quadrant is characterized by a low level of demanding and effectiveness. In other words, these criteria present a low demanding index even though they have small improvement margins; with little effort, the effectiveness is low.
- Finally, there are no criteria in the first priority quadrant, suggesting that there are no actions and that none of the examined criteria requires small effort to have high effectiveness. Improving criteria in this quadrant would have been relatively 'easy' in increasing citizens' satisfaction.

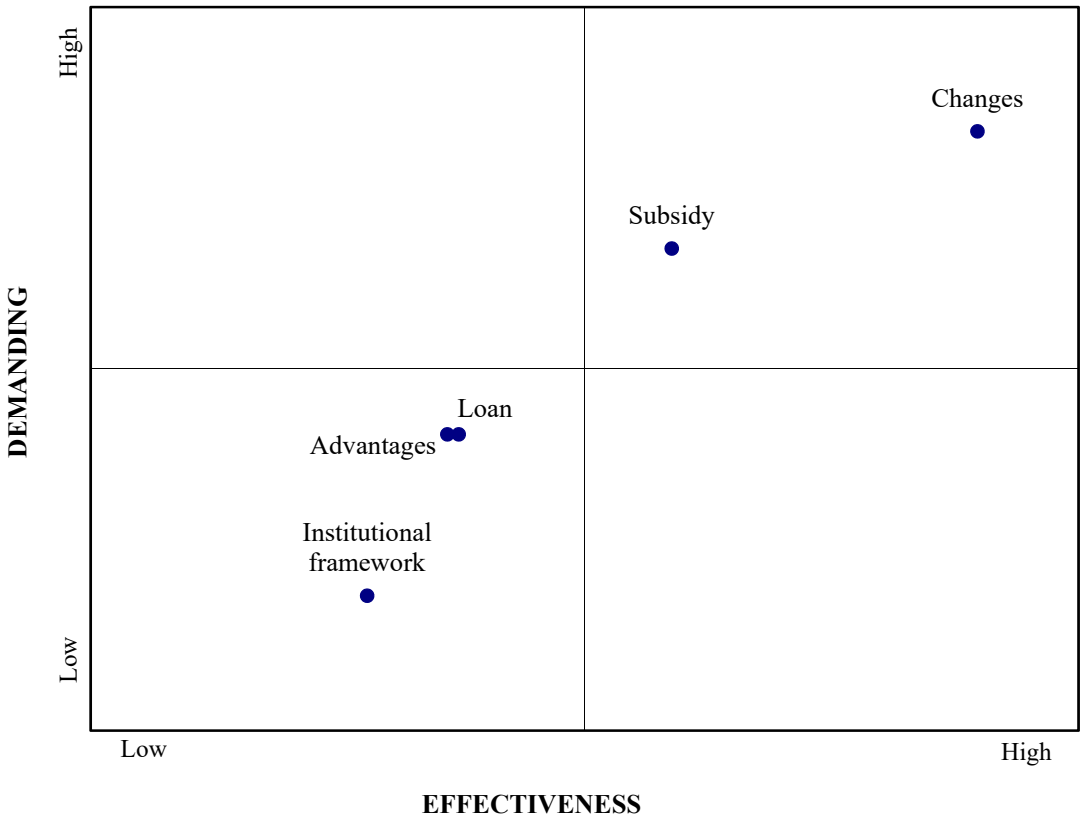

Figure 4. Improvement diagram: Citizens' demanding level and effectiveness in relation to the information from the media about renewable energy investments.

5. Discussion

While the media is often criticized for fomenting private rather than public interests, their strong influence could be leveraged for addressing pressing environmental issues [6,15,20]. With a view to support the adoption of renewables, for instance, the media could communicate clear and comprehensible information about the available investment schemes so that interested citizens have easy access to necessary information that may help them understand the complexities of current investment environments and evaluate the benefits of such investments [21]. In this respect, the media has the capacity to serve the crucial purpose of facilitating renewable energy investments, which, in turn, assist the transition to a low-carbon energy system that aligns with renewable energy targets [2]. Based on the influence that the media can exert, it is proposed to regard the media as key stakeholders that assume the role of becoming sources that provide easy-to-understand information about the shifting and complicated investment environment of renewables.

It may be important to consider that citizens in the study area are not satisfied with the media's information about renewable energy investments. This finding has potentially important implications as inadequate information about investments may be preventing interested citizens from investing in renewables in the study area. This argument is supported by the study of Vasseur and Kemp [4], which showed that insufficient information about solar energy was a reason for which householders, despite their interest, did not proceed to investments, but also by the study of Strazzera and Statzu [5], who concluded that information about innovative renewable types can enhance technology acceptance and maybe even adoption.

A plausible explanation for citizens' low satisfaction with media information would be that the media does not communicate effective messages regarding RES investments. In particular, the media often covers laws and legislative amendments but, in doing so, it tends to use confusing legal terminology and refrain from tailoring this information to the understanding of the general public. The limited level of information simplification can be particularly problematic if it is resulting from journalists' lack of expertise in RES investments and their possible inability to simplify and adjust the information material to the general public. This brings forward the need to pay more attention to journalists' training and seek ways to support them in communicating legal and financial information about RES investments. Another explanation for citizens' dissatisfaction with the media could concern the media's overall poor engagement in providing multifaceted information about renewable energy [23]. In other words, it is possible that the media does not cover equally all aspects of renewable energy and, as a result, may not be committed to ensuring that the public is informed about the shifting environment of RES investments on a regular basis. This, however, should not be confused with a deliberate attempt not to cover RES investments, but it is rather possible that other topics about renewables may be dominating media agendas, thereby resulting in fewer messages about investments.

If the media is to improve information about RE investments and contribute to RES deployment, it is necessary to monitor their performance through systematic studies and analyses [27,28]. To that end, multiple criteria satisfaction analysis can be highly useful as it reveals the areas of over-performance and under-performance, which, practically, means that it pinpoints areas that require attention [35,36]. In the case of the media, this kind of analysis can detect the information areas that fall below citizens' expectations. Under-performance areas in this study involved information about available subsidies for RES investments, as well as about changes in the institutional framework as these were found to be important for citizens. At the same time, the media is probably covering topics, which are less important for citizen satisfaction, such as the economic, environmental, and social advantages of renewable energy and the institutional framework of renewable energy. The latter suggests that the media may be over-focusing on aspects that do not meet citizens' information needs. Therefore, a strategic action for the media would be to dedicate fewer resources to providing information about these aspects and transfer them to the provision of information about available subsidies for RES investments, as well as about changes in the institutional framework. It is important, however, to ensure that the provided information on these aspects is adjusted to citizens' understanding who do not have expert knowledge about legislative and investment matters. As journalists may be lacking the expertise to simplify legislative and financial aspects of RES investments, it is recommended that academics or experts in RES investments prepare for and provide the media with information material tailored to the general public. Such cooperation would, on the one hand, help the media correspond to the information needs of citizens and, on the other hand, ensure the dissemination of accurate but comprehensible information about RES investments. Given that the environment of RES investments is subject to many changes due to the intense RES development plan that is being implemented across the European Union, it is necessary to ensure that efforts to inform the public are systematic and coordinated.

Results reported in this paper may also be considered within the wider context of citizen investments in renewable energy in the study area. With the existing policy that the media follows to cover RES investments, the percentage of citizen investment is quite high. However, this cannot be ascribed only to media information about RES investments, but it is rather possible that the wider policy framework attracted investments from citizens. To be more precise, from 2006 to 2015, Greece implemented feed-in-tariff schemes and with the establishment of Laws 3468/2006 and 3851/2010, it supported the installation of residential photovoltaics by establishing fixed prices [37–39]. The response of citizens was impressive and from 2012 to 2014, applications were suspended as the objective of installed capacity was exceeded. Although supporting schemes play a crucial role for citizen investments, the media could also support the decision-making of citizens who are interested in investing in renewables. To that end, the media will need to improve the ways in which they cover investments while ensuring that provided information is tailored to citizens. As the estimated value functions showed that citizens were slightly demanding, the media needs to exert relatively little effort in order to meet the expectations of citizens and increase their satisfaction.

Certain study limitations and directions for future studies ought to be stated. Regarding limitations, this study has examined satisfaction with the media in general and not with specific types of media. This means that it is not possible to reach conclusions about satisfaction with each type and it is not known how citizens evaluate different types of media in relation to their information about RES investments. In addition, our analysis examined five prominent criteria related to the information provided by the media about renewable energy investments. This, however, does not mean that there are no other criteria that are worthy of investigation. That is, the environment of RES investments is subject to vigorous policies and laws while investment decisions are affected by a multitude of factors, which means that there may be additional criteria that will have to be examined in terms of citizen satisfaction.

In relation to future studies, it is recommended to focus on journalists and examine the difficulties they encounter in covering RES investments and tailoring messages for citizens interested in investing in renewables. Building on this, it would also be worthwhile to examine journalists' attitudes towards cooperating with academics or experts in order to understand and simplify the relevant information material. The issues encountered by journalists as well as the ways to overcome them could be explored through in-depth interviews as they are suitable for addressing complicated research questions such as understanding whether a service is performing well and how to improve it. Another fertile area for future research is to analyze framing and discourse around RES investments as critical analyses of these may reveal which aspects of RES investments are dominant and how they are being covered. Moreover, since the Internet has expanded to the degree of changing media usage and contexts, it is necessary for future research to look into potential problems, including misinformation and selection bias. That is, user-generated content, which has become the norm in many online platforms, adds another component to information about RES investments, pointing to possible pitfalls of essential verification, which could be overlooked for the sake of producing news content swiftly. Finally, researchers may as well investigate predictive associations between media satisfaction and willingness-to-invest in renewables.

6. Conclusions

This paper has focused on citizen satisfaction with media information about renewable energy investments. Previous studies mainly focused on information in terms of its effect on decisions to adopt or invest in renewables. Nevertheless, media satisfaction seems to be relevant and, if improved, it may positively affect citizens' investment decisions. Even though the media covers topics related to RES investments, citizens were not satisfied with the information they provide suggesting that the media may not be disseminating effective messages, that is, the provided information may not be tailored to the general public. It

is thus recommended that academics or experts in RES investments provide the media with information material tailored to the general public. In this way, citizen satisfaction with the media would increase, while the dissemination of accurate but simplified material would be ensured. In addition, it is recommended that the media provide more information on available subsidies for RES investments, as well as about changes in the institutional framework as these information areas were found to be important for citizens. Moreover, citizens were slightly demanding and, therefore, with relatively little effort and resources, the media can correspond to citizens' expectations and increase their satisfaction. Finally, the main message from this study is to leverage the potential role of the media in renewable energy adoption by involving the media as stakeholders who are entrusted with the crucial task of disseminating simplified and updated information about current investment schemes and policy frameworks.

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Appendix A

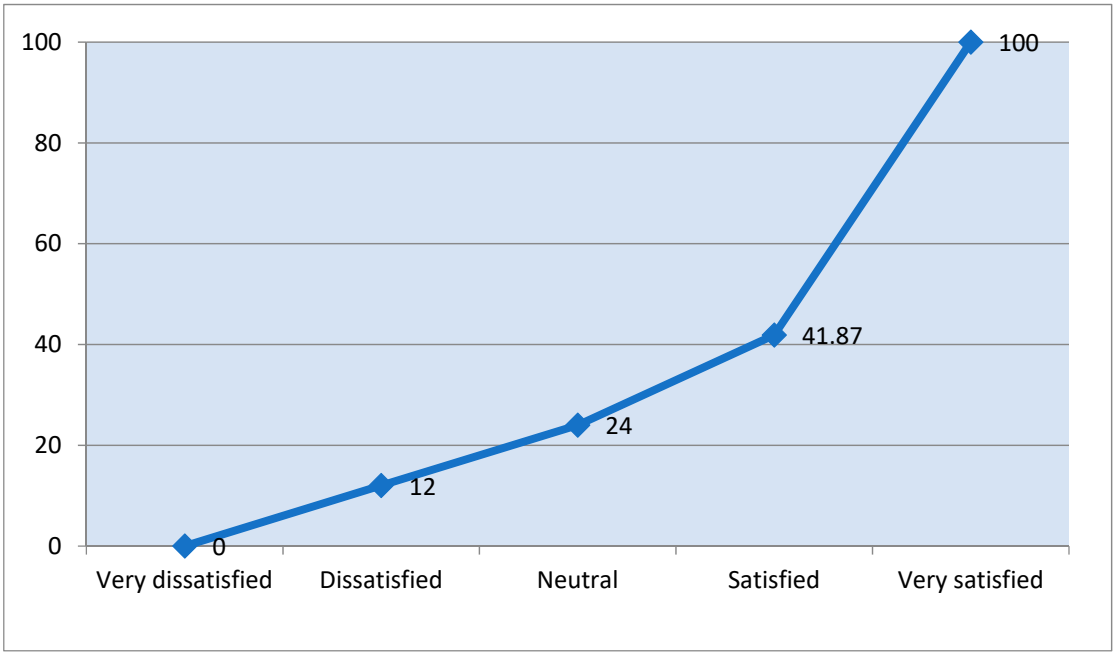

Figure A1. Global satisfaction value function for citizen satisfaction with media information about RES investments.

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