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Sustainability of the Energy Retail Market**

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Abstract

The literature on the impact of deregulation and liberalization in the energy market is very rich. Less present, however, is evidence on how the retail energy market has been affected by liberalization and deregulation policies. In addition, very few studies analyze liberalization and deregulation policies by relating them to their sustainability.

In this paper, we address one of the main challenges in achieving the Sustainable Development Goals, which concerns energy policy impact analysis. We analyze the evaluation of the *sustainability* of deregulation and liberalization policies in the retail energy market. To this end, we conduct a systematic review complemented by a bibliometric analysis of the state-of-the-art literature on the topic.

The main outcomes of the work are the creation of a detailed list of all potential impacts of regulatory and deregulation policies adopted in the retail energy market and the development of a multidimensional *framework* for the analysis of the sustainability of decision makers' policy choices.

This framework allows for a *balanced* analysis of the sustainability of policy decisions by evaluating the different technical, economic and environmental impacts jointly. It could be used to develop an organic system of indicators that can map the different impacts of policymaking in the retail energy market considering their interactions highlighted in the framework. Critical analysis of the existing findings leads us to identify future research directions.

Keywords – Deregulation, Electricity Retail Market, Energy Retail Market, Liberalization, Sustainability, Systematic Review

1 Introduction and contribution

Liberalization and deregulation have dramatically changed the energy market over the past four decades. With the *unbundling* of the *retail* market from the rest of the energy supply chain, different kinds of regulation and transition towards a free market have been introduced across the world. Despite this widespread transition, different countries have implemented different changes, from an initial level of transition to a complete *free market*.

The existing literature on energy sector liberalization and deregulation is extensive. Many studies analyze the UK and Californian cases, reporting discordant effects of deregulation policies, positive for UK and negative for California (see e.g. [1, 2]). Deregulation and restructuring of the USA electric industry, intended to produce cost efficiencies and price benefits for consumers, has been the subject of several studies reviewed in [3]. Despite numerous interventions, there is little reliable evidence that deregulation has had a positive effect on consumers in the US electricity industry.

On the other hand, Markard & Truffer (2006) [4] examine the impact of liberalization on the technical innovation of the electricity supply and [5] claims that recent technological trends imply a major shift in the network economy, leading to possibilities for inter- and intra-grid competition. Newbery [6] argues that, compared to the USA, much of the European countries lacks the legislative and regulatory power necessary to mitigate the market power of generators. Due to uncontested markets, reduced transmission and generation capacity, deregulation can lead to higher prices and reduced investment unable to support competitive prices. Recently, Necoechea-Porrás et al. (2021)[8], conduct a literature review of energy reforms implemented in the electricity sector to analyze the effects of deregulation on the energy market. The results showed a positive relationship between reform and market opening and price changes. Although the deregulation measures were designed to reduce the cost of electricity for consumers, changes in energy prices were only achievable over the long term, with the implementation of various measures (including disinvestment policies and rate cuts) to ensure that the deregulation achieved its primary goal of reducing energy prices. Although these studies are interesting, the results seem inconclusive, and the focus is not on the retail market but on the energy market as a whole.

A relevant and related topic is the *sustainability* of policy decisions in the energy sector. The role of policy decisions in the transitions of sustainable energy systems has been explored by [7] who highlight the need to clarify policymaking considering energy systems as sociotechnical, socioecological, and complex systems.

The *sustainability* of policy decisions has been addressed poorly in relation to liberalization and deregulation policies. In addition, there are few contributions in this area that analyze the retail energy market. A recent paper by Esplin et al. (2022) [74] who analyzed the Australian retail energy market states that for retail markets to work well, consumers need to be active and able to evaluate different offers.

Moreover, achieving the Sustainable Development Goals (SDGs) are on the agenda of all policy makers. Sustainable development is a "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs . . . in particular the essential needs of the world's poor, to which overriding priority should be given" ([9], p. 43)".

Gunnarsdóttir et al. (2021) [10] have addressed the topic of sustainable energy development as a complex and multidimensional issue, identifying four interconnected themes: i) access to affordable modern energy services, ii) energy supply, iii) sustainable energy consumption, and iv) energy security. Equitable access to modern, affordable, and reliable energy services is integral to sustainable development. A transformation of the current energy system is necessary but not possible unless it is

economically viable through, for example, cost-competitive technologies and changes in energy prices that reflect the external costs of energy.

In this paper we address the issue of assessing the *sustainability* of policy decisions considering explicitly the retail energy market. By sustainability assessment, following [13], we mean the process by which the sustainability implications of an initiative are assessed, where the initiative can be a proposed or existing policy, plan, program, project, piece of legislation, or current practice or activity. This general definition encompasses very different processes referred to in the literature as *sustainability assessments*.

Sustainability is defined in different ways and often with definitions that cover different aspects such as environmental, social and economic dimensions. In the literature there are different notions of sustainability referring to the whole energy market. Streimikiene et al. (2013) [14] identified three main pillars of the energy market considered as a whole: competitiveness, environmental sustainability and security of energy supply. These three pillars are commonly adopted by European countries. However, these pillars are general for the whole energy supply chain, and do not clearly identify the role of the retail market in each pillar but consider the retail market only in the competitiveness pillar. However, the role of retail cannot be relegated to competitiveness alone, because it plays a fundamental role in the three pillars proposed by the authors ([14]).

Two studies propose models to help assess the impacts of policy decisions. The first by [52] proposes a model of the possible impacts of competition on the retail market, identifying three main dimensions of impact: efficiency, differentiation, and equipment innovation. This model, derived from a survey of the literature, presents however a criticality in the deepening, within the efficiency dimension, of the indirect gains on wholesale, transport and distribution services. The second model, proposed by [69], highlights the multidimensional nature of impacts in the whole energy market (not only retail), identifying the following impacts: i) *Economic* and price impact, ii) *Social* impact, distinguished by impact on employment (also analyzed by [38]) and consumer interest (also highlighted by [52]), iii) *Environmental* impact, focusing on CO₂ emissions, and iv) *Technical* impact, highlighting the distribution-seller-customer relationship. These models emphasize the multidimensionality and interconnectedness of the impacts that are present throughout the energy market.

Ness B. et al.(2007) [15] offer a categorization of sustainability assessment tools by distinguishing indicators, product-related assessment of the product, and integrated assessment tools, which also include monetary assessment tools. Veleva et al. (2001) [16] introduce a model of 22 sustainable production indicators to increase firms' awareness and measure their progress toward sustainable production systems. [17] Waheed et al. (2009) [17] address the problem of effective sustainability assessments. La Rovere et al (2010)[18] propose a methodology to analyze the sustainability of electric generation taking into account the technical, socioeconomic, environmental, and technological factors of various alternatives to expand the sector.

Recently, Nastasi et al. (2022)[11] identified four challenges relevant to achieving the SDGs: i) state-of-the-art renewable energy technologies, ii) energy storage, iii) energy modeling techniques, and iv) climate and energy policy and impact analysis. Decision making for energy system transformation should consider the sustainability of the energy system in a broad sense, considering not only greenhouse gas emissions but also security of supply requirements, cost efficiency, and the additional environmental and socioeconomic impacts that energy systems induce (Hottenroth et al. (2022) [12]).

We analyze the topic of *sustainability* of policy decisions in the energy sector contributing to address the challenge iv) about the impact analysis of energy policy identified in Nastasi et al. (2022)[11]. Unlike other existing studies, in this paper we address the sustainability of policy decisions to liberalize

or regulate at the retail energy market level. We analyze the retail energy market because there is little literature focusing on it, and it is the market that affects consumers the most and is mainly observed by regulators in times of crisis and major changes like the current ones.

The main objective of the study is to provide a comprehensive overview of the state of the art literature on the *sustainability* of policy decisions in the *retail* energy sector and to formulate based on this stock of knowledge a conceptual *framework* for policy sustainability analysis in this market. To this end, we conduct a systematic review of the literature on the effects of liberalization on the sustainability of the retail electricity sector, complemented by a bibliometric analysis of selected papers.

The paper unfolds as follows. Section 2 introduces the methodology and details the approaches used for systematic review and bibliometric analysis. Section 3 reports a summary of the selected studies. Section 4 lays the groundwork for the development of the framework by identifying the main dimensions and impacts analyzed in the existing literature. Section 5 presents our framework for assessing the sustainability of policy decisions in the retail energy market. Section 6 discusses implications and future extensions. Section 7 concludes the paper and outlines directions for future research. The paper is completed with two appendices that provide technical details on the systematic review (Appendix A) and a table that summarizes the analyzed main characteristics of the studies (Appendix B).

2 Methodology

The methodology used in this paper combines systematic review with bibliometric analysis.

A systematic review is defined as “a systematic and explicit review of the evidence on a formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant primary research, as well as to extract and analyze data from the studies included in the review” ([19]). Tranfield et al. (2003) [20] showed the usefulness of systematic reviews of the literature in the management area to develop evidence-based decision support systems. Petticrew and Roberts (2008) [21] illustrate the specificities of systematic reviews applied in the social sciences, including management. We adopt the PRISMA statement ([22]) for systematic reviews but, considering the topic of our investigation, we will appropriately adapt the PRISMA methodology to the typical characteristics of the topic of our analysis based on what has been proposed by [21].

In our survey, all journal articles, conference proceedings, and book chapters written in English were considered. The databases consulted were Scopus (<https://www.scopus.com/>) and Web of Science (<https://www.webofknowledge.com>). The last time these sources were accessed was on 4th April 2022, after a first access on 10th December 2021. In line with the principle of reproducibility and transparency, we specify the complete search strategies for all databases, records, and websites used, including any filters and limits used. Details on the queries can be found in Appendix A.

The choice of keywords is crucial in a systematic review. The various keywords introduce biases that, together with the selection criteria of the papers, can influence the quality of the proposed work. To reduce this bias, we adapted to our context the PICO model ([23]), developed in the medical field, which proposes to highlight the main concepts and terms for the queries by organizing them into four main domains that are Population, Intervention, Comparison and Outcome. See Table 1 that shows the free text terms or natural language terms selected as keywords in our analysis of the literature.

	Population	Intervention	Comparison	Outcome
Key concepts	electricity retail market	Impact	<i>Not applicable</i>	Evaluation
Free text terms / natural language terms	Energy OR Electricity OR Power	Liberalization OR “free market” OR Competition	-	Impact OR Evaluation OR Status
	Retailers OR retail	Deregulation OR restructured	-	

Table 1. Keywords used in the systematic search developed according to the PICO Model.

In our initial search strategy, the keyword ‘sustainability’ was also included, but the search result was reduced (specifically 14 for Scopus and 33 for Web of Science), so it was decided to eliminate this keyword to have a larger sample to analyze. Interestingly, studies that analyze “sustainability” are a sub-sample of those that address policy decisions in the energy retail market.

The following selection criteria were adopted for the selection of articles:

- Work available/accessible online
- Work with a primary focus on the retail electricity market.
- Work that assessed the impact of regulatory reforms in the retail electricity market.

Any work that does not meet these conditions has been excluded from this review. To verify which articles met the requirements, two screening steps were performed: abstract and title screening (for an initial reduction of the articles under review) and full paper screening.

Thanks to abstract screening, it was possible to make an initial sorting of the papers, but it was not possible to find all the final papers only with this step. To be able to select the final papers, it was necessary to continue with a complete paper selection. We proceeded to the screening of titles and abstracts of the papers through the Mendeley Desktop Software ([24]), which in addition to the support of the screening phase, allowed us to detect possible duplicate papers not identified in the previous steps.

After the pre-selection phase is carried out through the screening of abstracts and titles, the remaining papers were downloaded (if available) and read carefully before being included in the review.

After performing the searches and collecting the results derived from the queries (specifically, the results were downloaded in BIB and RIS formats) were obtained.

The various selected papers were downloaded in pdf and their main bibliometric information (like DOI and Authors) were collected from the reference databases. The collection of the various identified items was done from the paper available online at the time of the queries (10/12/2021 and 4/4/2022). All data items extracted from the selected works were collected on an Excel spreadsheet.

The data used for the bibliometric analysis were taken from Scopus through a manual search of the selected papers, searching them on the platform using the DOI. Data for bibliometric analysis were collected on the 4th April 2022.

To further investigate the content of the articles selected through the systematic review, we performed a quantitative bibliometric analysis based on the Bibliometrix R package ([25]), which is an open source software freely available and user-friendly. Using this tool, the following analyses were performed:

- *Thematic Map*, is a map based on co-word network analysis and clustering. The methodology used for the analysis is presented in [26]. The map starts with a network of co-occurrence keywords to plot in a two-dimensional chart the typological themes of a domain. The diagram in Figure 1 shows a summary of how to interpret the different areas of the map.
- *The coupling map* is a two-dimensional plot in which the x-axis represents cluster centrality index), while the y-axis depicts cluster effect (as measured by the Mean Normalized Local Citation Score, whose acronym is MNLCS).
- *Most frequent abstract words*, which is useful for understanding the main topics covered in the selected documents based on the frequency of words (in our case the bigrams, i.e. word pairs).
- *Most referenced work in the literature*, useful for determining the trend of the most studied topics and for providing a potential chronological interpretation.

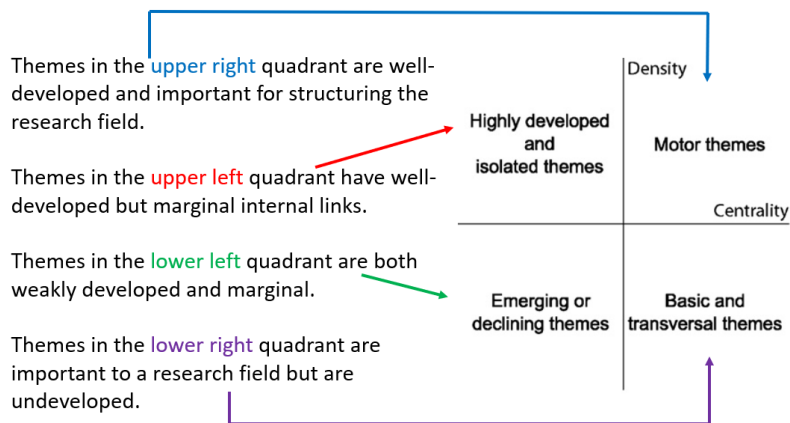


Figure 1 Thematic map structure. Source: [26].

Through searches based on our criteria, whose queries are described in Table A and Table B of Appendix A, 402 results were obtained from Scopus, of which 368 were in English and 507 from Web of Science, of which 499 were in English. The results were merged through the Mendeley desktop, eliminating the 214 duplicates. In the first selection round, the abstracts, and titles of 653 articles were analyzed. After this phase, 483 articles were removed, leaving 170 documents to be further investigated in the second screening phase. During the second phase of selection, it was not possible to obtain a complete manuscript for 28 articles. At the end of the selection process, we have discarded:

- 44 articles because the focus of the work was not the energy retail market,
- 8 articles because the focus of the work was not the electricity market,
- 37 articles because the effects of liberalization or deregulation on the electricity retail market have not been analyzed.
- 8 articles were discarded after a critical discussion on the quality of the work and the methods adopted.

At the end of this selection process, we obtained a set of 47 articles (see reference [27] to [73]). After all the various operations of extracting and processing the information on these 47 articles, the queries

were re-executed on 4/4/2022 for checking the updates, resulting in a new article [74] that was added to the previous 47, bringing the total number of selected papers to 48. The summary scheme of our review, according to the PRISMA principles (2020 version)[22] is reported in Figure A of Appendix A.

3 Overview of the analyzed studies

The 48 collected papers were published from 1997 to 2022. The articles have been published in 28 different sources and have an average number of citations per article of 13.31, which is synonymous with a high academic interest in the topic. See Table 2.

Although the articles focus on energy retail, they address it with different research questions and facets. Individual study characteristics such as main research questions and geographic and temporal contexts are presented in the summary table reported in Appendix B.

Description	Results
Timespan	1997-2022
Sources (Journals, Books, etc)	28
Documents	48
Average years from publication	7.33
Average citations per document	13.31
Average citations per year per doc	1.491
References	1806
<i>Scopus document type</i>	
article	40
conference paper	5
review	3

Table 2 Summary of bibliometric information of the selected studies

Figure 2 shows the thematic mapping carried out on the 48 selected studies. The theme map uses keywords and fields allowing to capture an article’s content with greater depth and variety.

The upper right square shows the motor theme. They are characterized by high centrality and high quality and density. Among the “motor themes” that are the more developed in the literature, the main concern is competition in the electricity market and the relation with electricity supply. These topics are related to various concepts such as performance, consumer/retail relations, and energy consumption and production relations.

Figure 2 shows a cluster between motor themes and high-density themes related to the electric industry, competition, and energy efficiency. These themes are related on how competition can stimulate consumers to be more energy efficient, as we will discuss in the next section.

In the upper left quadrant of Figure 2 there are themes related to competition, electricity and UK market (orange cluster). These themes are densely developed as the UK was one of the first countries to approach the liberalization of this sector and therefore to be analyzed (as already seen in [1] and [2]). In the lower-left quadrant, there are emerging or declining themes. Here there is the theme of electricity retail markets that relates to marketing. Japan (see [28, 41, 46, 51, 58, 60]) and Australia [44, 61, 67, 69] received increasing attention in the literature in recent years.

Below this last quadrant there is another cluster which includes the themes of deregulation and energy policy in retail electricity markets.

Finally, the lower right quadrant of Figure 2 shows fundamental and transverse themes. In this area, the appearing themes are sales, cost, and retailing. These themes are very broad and apply to a wide range of fields; additionally, it should be noted that these words were frequently present in papers discarded during the selection process that did not always refer to the electric sales market, demonstrating how these themes are crosscutting across various research fields.

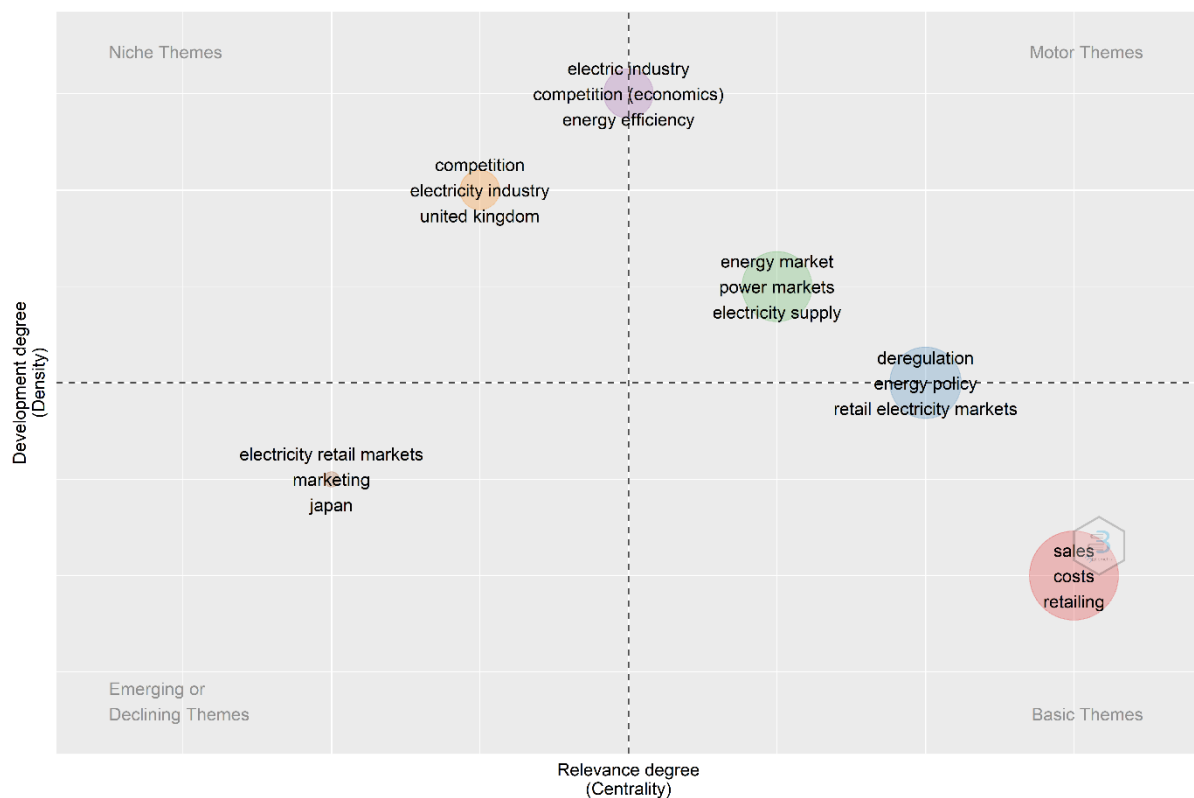


Figure 2 Thematic map of the 48 selected articles. Number of Words 250, min cluster size per thousand docs 6, field keyword plus.

The coupling analysis differs from thematic analysis in several respects. Thematic analysis is based on co-word network analysis and clustering, while coupling analysis is based on coupling network and community detection results on a bi-dimensional map. This difference is evident in Figure 3. Figure 3 shows on the x-axis the centrality measure (as is Figure 2) but on the y-axis it reports the impact (measured through the Mean Normalized Local Citation Score-MNLCS). Through the combined use of these two analyses we can identify which themes (emerging, basic, motor or Niche) have a high impact in our setting. The results of the coupling analysis highlight that the issues of “competition” and “electricity supply” in the retail market are central in our 48 articles and have an average impact (see the green ball in the top left quadrant of Figure 3). These themes are present also in Figure 2 underlines that this theme is not densely treated in the literature (i.e., it has a low degree of development) but has a significant impact in the literature. This result could suggest to further develop research on these issues. Articles that deal with sales, costs, and power markets are central and have a high impact, emphasizing the high attention in the literature on these issues (see the violet ball in the top right quadrant of Figure 3). Another central theme, but with less impact, concerns the study of costs and sales in the commerce (see the red ball in the bottom right quadrant of Figure 3) as we have seen in the bottom right part of the Figure 2. The small impact of these topics comes from a lack of attention in the past to the role of costs in sales markets which, in recent years, has led to an increased focus on business risk in the energy retail sector as well and which may see increasing attention in the future in the literature

(not least because of the unstable situation currently prevailing in many countries with regard to energy supplies). Despite the small impact in the literature, this is a *basic theme* according to the thematic analysis showed in Figure 2, highlighting another theme that could be further developed in future research. Finally, we observe a small impact of the themes of energy policy and deregulation in the electric industry that are also non central themes (see the blue ball in the bottom left quadrant of Figure 3). This result is in contrast to what is shown in figure 2, highlighting how, despite the lack of centrality, we may see increasing attention in the future in the literature of these topics. Thanks to the union of the coupling map and thematic map results, we can consequently learn that the existing literature has little dealt with the problem of energy policy in the deregulated market as it is assumed in the cases of deregulated markets the market will self-regulate itself.

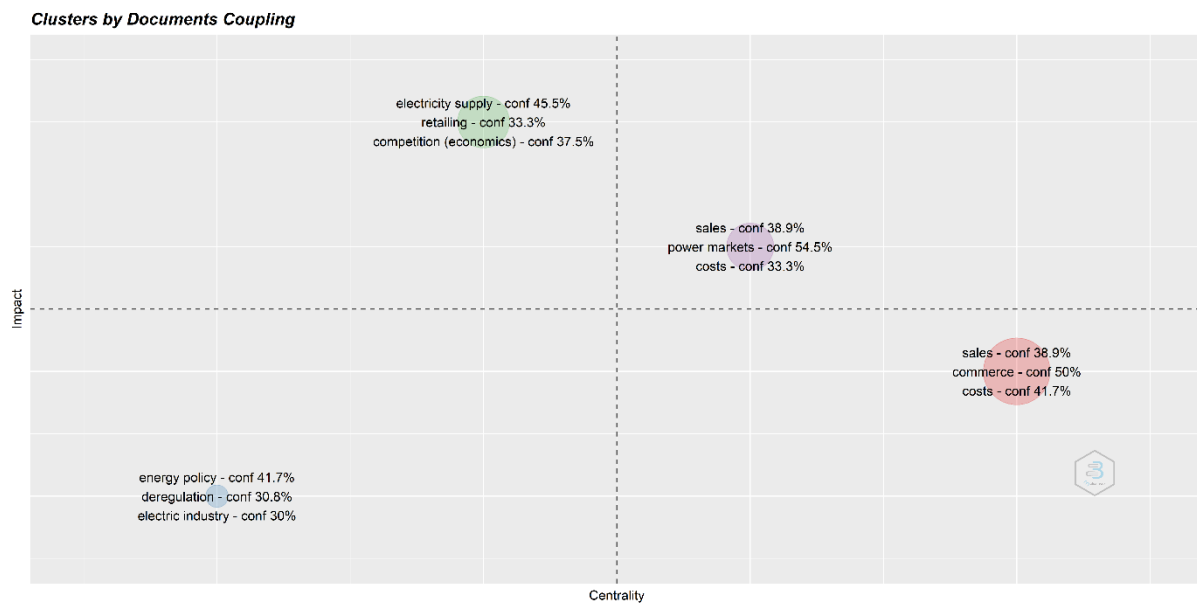


Figure 3 documents coupling measured by reference using local citation score like impact measure. Number of Units 250, min cluster frequency 5. Labelled by keyword plus.

The analysis of the most frequent abstract words enables us to gain a deeper understanding of the structure of the main topics discussed. Figure 4 shows the bigram of the most cited works present in the abstracts of the 48 selected documents. Excluding the main field of interest and its synonyms (electricity market and retail market), the most frequent words are related to the price of electricity and retail prices, as also suggested by the results proposed earlier in our work. The second word most frequently used, business risk, is also the most important negative factor highlighted in the literature, on which we will come back in the next section. It is also very common to examine the topic of consumer switch-over, which is evaluated in the literature as a measure of market competition health. Another frequent word is natural gas, which is used as a bundle service in electricity sales. In conclusion, words related to market structure (i.e., market structure, vertical integrated/integration, and their synonyms) are less frequent. These topics are discussed in [42, 61, 36, 63].

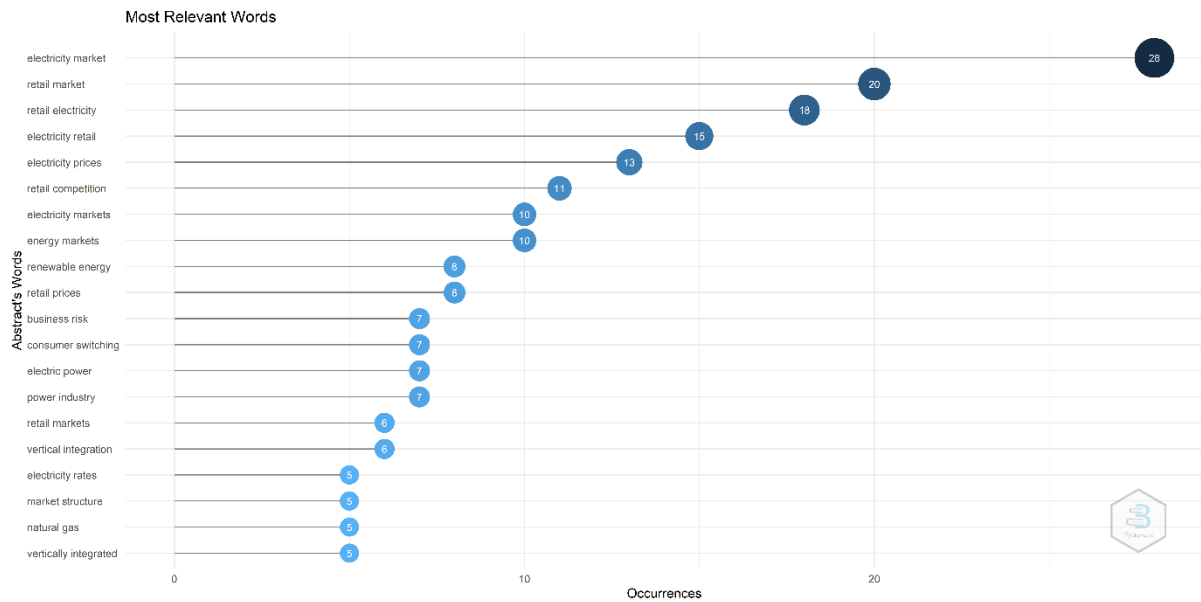


Figure 4 Bi-diagram of the most relevant words

The most referenced works are useful for determining the trend of the most studied topics and for providing a potential chronological interpretation. Figure 5 shows the bullet plot of the most cited articles that are respectively [59, 39, 34, 69, 51, 61].

The first article [59] received a lot of attention from the literature (133 citations) because it attempts to assess the state of the art of retail competition in the electricity market in 2008, a crucial moment for European markets that were at their initial stage of liberalization.

The second article [39], with 108 citations, examines how the retail deregulation process impacts the relative efficiency of governance structures, which vary from fully vertically integrated institutions to market transactions. The third paper [34] has been cited 49 times and focuses on estimating the changes in price elasticity in the residential electricity market after the deregulation. The fourth one [69] seeks to assess the impact of the reform of the electricity market and enriches the literature by exposing market concerns about focusing only on the economic dimension of the problem. The fifth one [51] seeks to assess the impact of liberalization of a retail electricity in relation to consumer satisfaction and household switching behavior in Japan. The interest in the literature of this article derives from the high interest of the analysis of consumers both on the consumer behavior side of the market (also treated in other selected works such as [62] and [71]) and on the consumer switching side, an indicator also used in the policy making field to evaluate the degree of competitiveness of the country (this aspect will be deepened in the next sections).

The last paper [61] analyzes the electricity market models of selected countries in the developed world. This article received 25 citations, despite being published relatively recently, in 2016. This work is influential in the literature as it asserts that the liberalization of the electricity market can help to achieve the key objectives of sustainable energy development. All these works highlight different aspects of liberalization or deregulation, synonymous with the fact that the one-dimensional focus (such as price) is not sufficient to assess the sustainability of policy makers' decisions in this area, but a broad-spectrum view is needed.

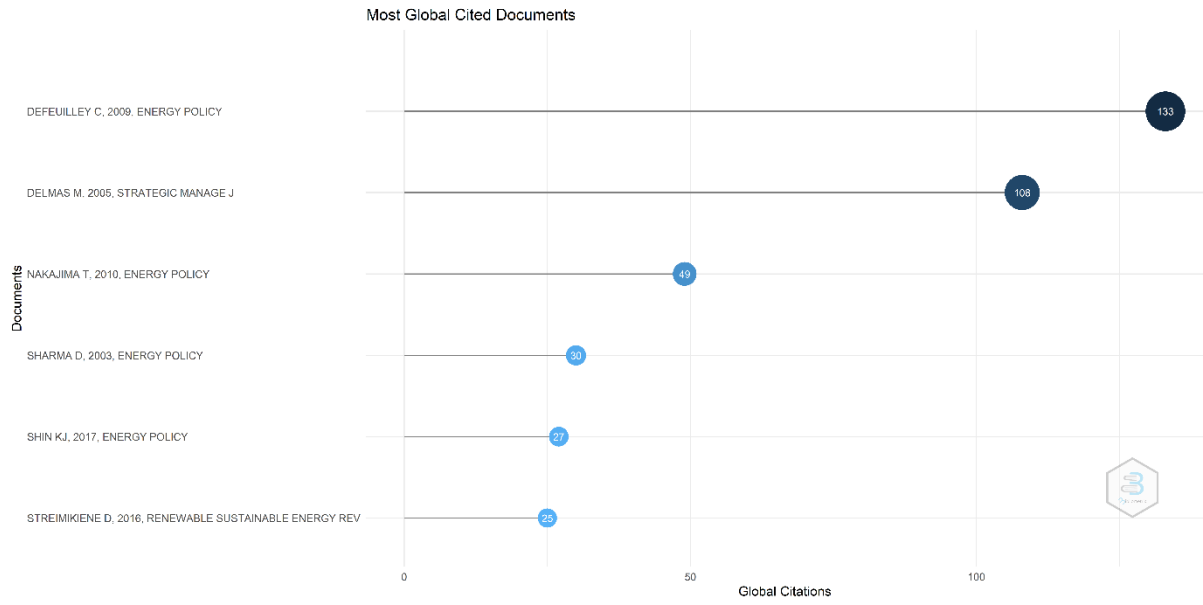


Figure 5 Bullet plot of the Top 6 most cited papers: Defeuilley C. 2009, Energy Policy [59], Delmas, M. Strategic Management [39]. Nahajima T. Energy Policy[34], Sharma D. Energy Policy[69], Shink k. Energy policy[51], Streimikiene D. Renewable Sustainable Energy Review [61]

4 Towards the formulation of a framework: the elements extrapolated from the existing literature

After conducting an overview of the selected papers, in this section we present the results of the analyses performed on the content of the selected papers. The table reported in Appendix B shows the articles selected by the systematic review reporting for each article: the reference, its article classification according to the Scopus database, the type of market analyzed, the Country analyzed, the reference year of the study and the Intervention (research question) analyzed.

To make the best use of the content of the 48 selected papers, we extracted from their texts any reference to potential policy impacts on the retail energy market by categorizing them in one of the three following effects: i) effects on market structure and operators, ii) effects on consumers and prices, and iii) effects on the environment.

The elaborations focused on a careful classification of the results presented in the papers, considering the types of markets analyzed, contextualizing them so that the impact of the policies carried out could be accurately extrapolated. We classified the results of the papers according to the type of market structure they refer to, considering deregulated market, liberalized market, market in transition, mixed market, restructuring market and theory market analysis. *Deregulated market*, feature grid operators that administer wholesale markets to ensure reliability on the grid and prevent blackouts. Multiple retail suppliers buy generation and sell electricity to end-users. *Liberalized market*, refers to the liberalization of energy markets, (associated mainly but not exclusively with the electricity generation market), bringing greater competition to the electricity market in the interests of creating more competitive markets and price reductions through privatization. *Market in transition*, where progressive liberalization/deregulation is being considered or is in the early phase. *Mixed market*, where co-exist different market structures, cases of mixed market forms (often reported in cross-national studies). *Restructuring Market*, where after the implementation of market reforms considerations of re-imposing regulation are made. *Theory market analysis*, where the analysis of the market structure is carried out in a theoretical work.

To avoid bias and distortion in the presentation of results, the categories assigned to each paper refer to the context that the authors attribute within the article. The only cases of deviation from this allocation principle relate to theoretical articles and the articles dealing with different countries and market structures, which we classified as ‘mixed market structure’.

Tables 3, 4 and 5, described in the next section, provide a detailed list of all potential impacts extracted from the reviewed literature.

4.1 Effects on market structure and operators

A first set of relevant impacts analyzed in the literature consists of the effects of liberalization and deregulation policies on market structure and operators.

Table 3 summarizes the results (the effects on market structure and operators) according to the type of market and reports in the last column the reference to the papers that showed the considered effect. The results are very heterogeneous and varied. The main aspects that emerge on the characteristics influencing operators’ performance are: *Size*, as shown in [65, 52], characteristics of owners (*ownership*

type), as proposed by [43, 44, 45, 52, 73], *diversification* of offers as shown by [39, 41], *horizontal integration*, as evidenced by [59, 49, 47, 38], *vertical integration*, as supported by articles [52, 63, 37, 42], the *incumbent* status of the operators, as reported by [59, 35, 70, 71].

Other aspects related to the effects on market structure and operators, presented in the literature, are the impact of R&D expenditure [46], the status of competition in the market [48] (without investigating the causes), and operators' behavior [67, 40, 42].

Type of market	Effect on market structure and operators	References
Deregulated market	Diversification impact on efficiency	[39]
	Financial issues for investor-owned utilities	[45]
	High negative impact on R&D expenditure	[46]
	Low Competition	[48]
	Ownership impact on efficiency	[43]
	Possible abuse of market power by retailers	[40]
	The RPS program was more influential than the electric prices	[49]
	Companies' size impact on market strategies	[65]
	externalities for small firms	[65]
	utilities could not recover their energy procurement	[45]
	Withdrawal of the cheapest offers from the market in case of a price cap	[67]
	Not analyzed	[44],[49],[57],[60],[66],[73]
Liberalized market	competitive advantage for horizontally integrated retailers	[62],[42],[50]
	Difficulties for incumbents	[59],[35]
	Failure to prevent market concentration	[54]
	Competitive advantage for vertically integrated retailers	[52]
	Increased risk for small and non-integrated companies	[52]
	Increased service costs for independent retailers	[35]
	Negative correlation between price and market concentration of the largest retailer	[29]
	Negative impact on retailers only (externalities)	[63]
	Possible double margin for an incumbent	[70]
	Service quality impacts information transparency	[56]

	Supplier stimulated to be more efficient	[59]
	unstable dynamics of energy prices	[68]
	Not analyzed	[36],[51],[69],[74]
Market in transition	Higher power charges	[58]
	Increase in operating costs	[32]
	Increase in the number of operators	[33]
	Increased business risk	[33]
	Low Competition	[27]
	New business opportunities	[41]
	Possible increase in total jobs but possible unemployment for pre-existing retailer workers	[38]
	Competitive advantage for vertically integrated retailers	[37]
	Reduced profit	[32]
	Advantage of incumbents and regional vendors	[71]
Mixed market	Electricity suppliers are incentivized to vertical integration.	[42]
	Income elasticity increased	[34]
	Possible higher sustainability after the retail creation	[61]
	Reduced Exit Barrier for Retailers	[47]
	suppliers transformed spot price rises and fall into profits	[42]
	Not analyzed	[30]
Restructuring Market	Increase in the number of operators	[64]
	Very high concentration in 3 major retailers	[64]
	No change	[72]
Theory market analysis	Utilities will separate their services into the four components of the distribution, transmission, generation, and customer services.	[55]
	Not analyzed	[28],[31],[53]

Table 3 Summary of the results of the literature review: Effects on market structure and operators

4.2 Effects on consumers and price

The impacts of deregulation and liberalization policies on consumers and price levels are very different and vary according to the scenarios and contexts considered. Within the same contexts, contrasting evidence is also observed. Table 4 shows the heterogeneous results and demonstrates that they do agree on the effects of the liberalization and deregulation on price in the different situations.

Some works suggest that the type of ownership may influence the final price, with public ownership, as claimed by [43, 44, 73], offering lower prices. This is a rather surprising result. In addition, new choices and commercial innovation in the market could lead to improvement consumers. However, as pointed out by [52], innovation and new commercial choices are an effective advantage only for the so called “active customers”.

Type of market	Effect on price and customers	References
Deregulated market	The final regulated price leads to low consumer awareness by customers	[45]
	In some cases, higher price	[40]
	Lower Prices	[66]
	Not lower prices	[40],[58]
	Not optimal outcomes for consumers.	[44]
	Ownership impact on the price	[43],[44],[73]
	Possible future lower price	[60]
	Possible higher <i>Base</i> price	[67]
	Small discount for new (Active) customers	[67]
	Transitory price reduction	[57]
	Impact of utility dimension impact on the price	[65]
	Not analyzed	[39],[46],[49]
Liberalized market	Impact of country heterogeneity impact on switching rate	[62]
	Increased switching rate	[36]
	information asymmetry	[52],[29],[74]
	Limited benefit for household customers in case of market concentration	[62]
	Limited Benefits for Small and residential consumers	[52]
	Limited effect on residential prices	[69]
	Lower price for commercial and industrial sectors	[69]
	New choice opportunities	[51]
	New opportunities for active customers.	[59]
	No gain for passive customers	[59]
	welfare risks to vulnerable and low-income consumers	[54]
	Positive impacts on consumer engagement	[36]
	Possible higher price	[29]
	Possible increase in bundle gas+energy+district heating offers	[50]
	Possible optimization of consumption and costs with smart meters	[54]
	Scarce switching rate	[52]
Crucial role of sales information in the market	[74]	
Not analyzed	[35],[63],[68],[70]	
Market in transition	Higher price under competition scenario	[32]

	Increase in eligible consumers with regulated price	[27]
	Low market opening ratio	[27]
	Lower prices	[58]
	Possible improve welfare	[38]
	The regulation of the price disincentivizes the switching rate	[27]
	information asymmetry	[71]
	Price restriction is a barrier to business innovation.	[71]
	Not analyzed	[33],[37],[41]
Mixed market	competition has benefited consumers	[30]
	Doubt about consumer benefits	[42]
	Lower price Residential customer transitory period	[47]
	lower prices	[30]
	Multimarket set to a collective market power at the expense of consumers	[42]
	Natural gas demand substitute for residential and commercial energy but complementary for industrial	[30]
	no benefit to commercial or industrial customers	[47]
	There are no significant differences in price elasticity between deregulated and not regulated countries	[34]
	Not Analyzed	[61]
Restructuring Market	Limited benefit	[72]
	Little influence of customers over electric rate	[72]
	No impact on prices	[72]
	Price restriction is a barrier to business innovation.	[64]
Theory market analysis	The price regulation of RETAILCOs would be greatly reduced or eliminated.	[55]
	Not analyzed	[28],[31],[53]

Table 4 Summary of the results of the literature review: Effects on consumers and price

4.3 Effects on Environment

Surprisingly, only a minority of the articles selected in the systematic review include an outcome related to the retail market decision and its effects on the environment. These articles are summarized in Table 5. Wakiyama and Zusman (2021)[66] and Sharma (2003)[69] highlight a negative environmental effect of the various policies adopted, estimating an increase in CO₂.

Jang and Beruvides (2020)[49], on the other hand, focuses attention on the relationship between final price and investment in renewable energy (highlighting a not so obvious relationship between these two parties) in the US deregulated market scenario.

Furthermore, Thomas (2014) [54] and Goto and Sueyoshi (2016)[41] (and partially also Streimikiene and Siksnyte (2016)[61]) evaluate the introduction of smart meters or other forms of optimization of consumption (and consequent reduction of waste) which has a beneficial repercussion on CO₂ emissions.

These articles, although few (only 6 out of 48, or 12.5% of the sample) do not agree on the environmental effects but show a relationship between the energy retail market (through consumption policies, additional services, and final price) and the environment.

Type of market	Enviromental effect	References
Deregulated market	Possible increase in CO ₂ emissions in the presence of retail market	[66]
	renewable energy investments are affected by the state electric prices	[49]
Liberalized market	CO ₂ emissions increased after electricity reforms	[69]
	Possible optimization of consumption and costs with smart meters	[54]
Market in transition	Possible stimulation in the establishment of smart communities and the proliferation of smart meters.	[41]
Mixed market	The opening of the retail market affects sustainability	[61]

Table 5 Summary of the results of the literature review: effects on the environment

5 A framework to assess the sustainability of policy decisions in retail energy market

The analysis of impacts reviewed in the previous section shows that policy decisions in the retail energy market are characterized by multidimensionality and interconnectedness. The models described in the selected literature address partial and specific aspects of the impacts of policy decisions on the retail energy market. Our goal is to bring together the evidence of the literature, composing it into a single all-inclusive framework.

The different dimensions and impacts highlighted in the existing literature come together in our framework to assess one *overall sustainability*. This sustainability, consequently, is the equilibrium of the different impacts involved in the energy retail market.

The different dimensions are articulated in the relationships between the different market actors, given the multi-actor nature of the context.

Integrating the experiences gathered from the literature, we propose a framework for assessing the sustainability of policy maker decisions about the retail market, which seeks to highlight the aspects of multidimensionality and interconnectedness among the different actors in the market.

The framework we proposed is organized into three main parts: the actors, the relationships between them and the potential impacts of policy decisions.

Figure 6 shows an outline of the proposed framework.

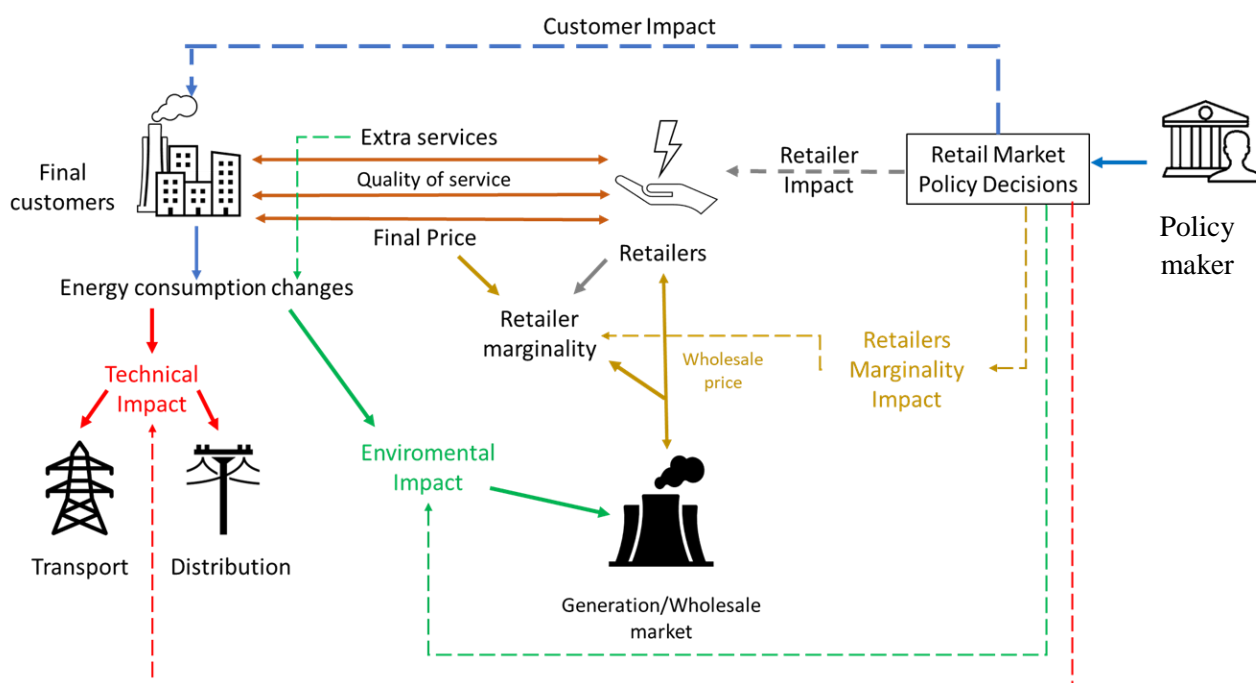


Figure 6 A framework to evaluate the sustainability of the policy decision in the retail energy market

The *actors* identified and involved in our framework are policy makers, retailers, end-users, transport operators, distribution operators, wholesale operators (generally coincide with generation operators). *Policy Maker*, the actor who has the power to elaborate and determine guidelines and strategies on the most relevant issues for the retail energy market. *Retailers*, actors involved in retail sales with the final

customer. *End-users*, final customers, energy users. In the proposed framework, for simplicity and without losing generality of analysis, no distinction is made between different customer segments (e.g. households, commercial enterprises or companies). *Transport operator* is the actor responsible for transporting energy over long distances. It does this via extra-high, high, and medium voltage cables. *Distribution operator*, actor in charge of transporting and delivering electricity to the end customer through the medium and low voltage distribution networks. In some cases, like Tukey, the distributor can be also the retailer of a specific area. *Generation/wholesale operator*, in many cases, energy wholesale is carried out directly by the energy production companies, so we decided to merge these two aspects into one single actor. Whoever oversees the retail sale of energy to the end customer, buys energy from the power exchange or from producers, so it is important to consider this relation during the policy decision.

The *potential impacts* considered in our framework are i) impact on consumers, ii) impact on sellers, iii) impact on marginality, iv) technical impact and v) environmental impact.

The first two impacts, impact on *consumers and sellers*, in the literature are often referred to the switching rate of consumers. However, to better investigate in depth this relationship, the following dimensions are made explicit in our framework.

Extra services, such as smart meters and bundled sales of different services such as gas or district heating. This dimension relates to the innovation of market offers.

Quality of service, which includes the quality of service to the consumer and the quality of information available to the consumer. This last dimension is very important to consider, otherwise, an asymmetry between the consumer and the retailer distorts consumer choice ([52, 56,74]).

Final price, is a standard economic dimension. The impact *on marginality* is declined in the relationship between generation/wholesale with retailers. For this impact, the literature contains theoretical contributions that underline the importance of estimating margins for policy decisions and propose tools to support this estimate ([31]).

The *technical impact* declines in the relationship between consumers (or rather, their energy consumption) and distributors/transport. This dimension, which is not analyzed in the collected literature, will be increasingly important in the future with the spread of smart communities, smart grids, and prosumers. This type of scenario, as highlighted by Omine et al. (2016)[75] and do Prado et al. (2014)[76], will lead to the next generation of retail electricity market decentralization in the future, which will bring several technical challenges to address in transmission and distribution systems.

Environmental impact is linked, in the retail sector, to policies to optimize consumption and reduce energy waste. 15 highlights the possible use of smart meters (also through offers from sellers that include them). This impact relates consumers to the generation/wholesale market, highlighting how decisions in the retail arena alone can affect CO₂ emissions ([41, 49, 54, 61, 66, 69]). Do Amaral et al. (2014)[77] goes further and in their work analyze the possible future scenario of large-scale deployment of smart meters. In their work, they highlight how CO₂ emissions could potentially be reduced (with a benefit to the environment) thanks to smart meters with a benefit for consumers as well. They also claim that distributors can benefit from this instruction by minimizing transmission and distribution losses. The diffusion of this technology should therefore also be taken into account by possible incentive/obligation policies that policy makers could impose on sellers (e.g. obligation to provide smart meters to domestic customers).

The analysis reported in Section 3 further supports what is set out in detail in the framework, namely the multidimensionality and interconnectedness of the different actors in the systems. In particular, the thematic analysis (see Figure 2) shows us the interaction between the issues of generation market, retail market, competition and price. The coupling analysis illustrated in Figure 3 added further themes, highlighting the relationship between consumer switching and business risk in the market, which is not

only related to the price proposed by retailers but also to the quality of service and the services offered. The word frequency analysis (see Figure 4) instead, supports us in making explicit the dimension of retailer marginality that is linked to “vertical integration” and “business risks”.

The various collected works, despite their heterogeneity, identify influential characteristics of the industrial structure of the operators that need to be evaluated in the policy making context.

To adopt the proposed framework, it is necessary to perform a context study to investigate the consumer and operator sides.

The main characteristics of existing *operators* to be analyzed in the industry include: i) size ([65, 52]), ii) ownership type ([43, 44, 45, 52, 73]), iii) the diversification of offers ([39, 41]), iv) horizontal integration ([62, 52, 50]), v) vertical integration ([52, 63, 37, 42]), vi) the incumbent status of the operators ([62, 35, 70, 71]).

These operator characteristics must be carefully evaluated to gain insight into the industry structure and to prevent or avoid instances of concentration, which, as evidenced by [29, 64], is an industry-wide characteristic that must be addressed. The reason is to avoid the impact on consumers of market concentration which creates market inefficiency ([62]).

Once the characteristics of the operators have been assessed, attention must be paid to the consumer side. The literature shows that the first fundamental characteristic to take into consideration for an effective welfare improvement concerns the division between passive and active customers ([67, 59]). In addition to the widespread division of consumers into commercial and industrial residential segments, the *segmentation* of consumers has allowed studies in the literature to highlight how, in some cases, there have been price increases or limited decreases only for certain segments, even if the literature does not agree on the effects of price increases or decreases attributable to policy decisions. The existing literature has carefully underlined how direct decisions on price (such as price restriction) have direct repercussions on the market. Brown et al. (2018)[64] and Erdogan et al. (2022) [71] highlight how this type of policy influences market innovation, while [45] highlights how there has been a disincentive effect on attention to energy wastage (with possible consequences in terms of avoidable CO₂ emissions).

The proposed framework, therefore, must be adapted according to its own context and the characteristics of the industrial context and consumers.

This contextualization of the framework also makes it possible to mitigate the bias of aggregation of information, which, as Dormady et al. (2019) [40] state, can lead to the risk of over-interpretation of the existing studies.

An example of the application of this framework to a possible liberalized market scenario is illustrated in Figure 7. Thanks to the framework outlined in Figure 6, we can highlight the relevant relationships for the assessment of the impact of the sustainability of a liberalized market taking into account the possible impacts and changes that occur.

Specifically we identify the consumer protection and monitoring activities by the authority (constituting the *customer impact*); a possible increase of retailers inside the market, defined in the proposed framework as *retailer impact*; a *retailers marginality impact* for sellers, because sales margins become, due to the “competitive” nature, market driven, i.e. linked to the purchase price from the wholesale market and the final price determined by competition. Competition could also stimulate the provision of extra services by sellers, which could also be related to consumption optimization or real time monitoring. Furthermore, competition between sellers would also stimulate higher quality of service and transparency of information.

Consumers, in a possible active consumer scenario, can optimize their consumption (in our scenario thanks to smart meters provided by the seller) and increase or decrease consumption according to price conditions. Consumption optimization reduces energy waste, which consequently leads to less demand

for “superfluous” energy on the generation side (*environmental impact* in our framework). The change in consumption behavior (price-driven increase or decrease) may have repercussions on the distribution or transport (*technical impact* in our framework).

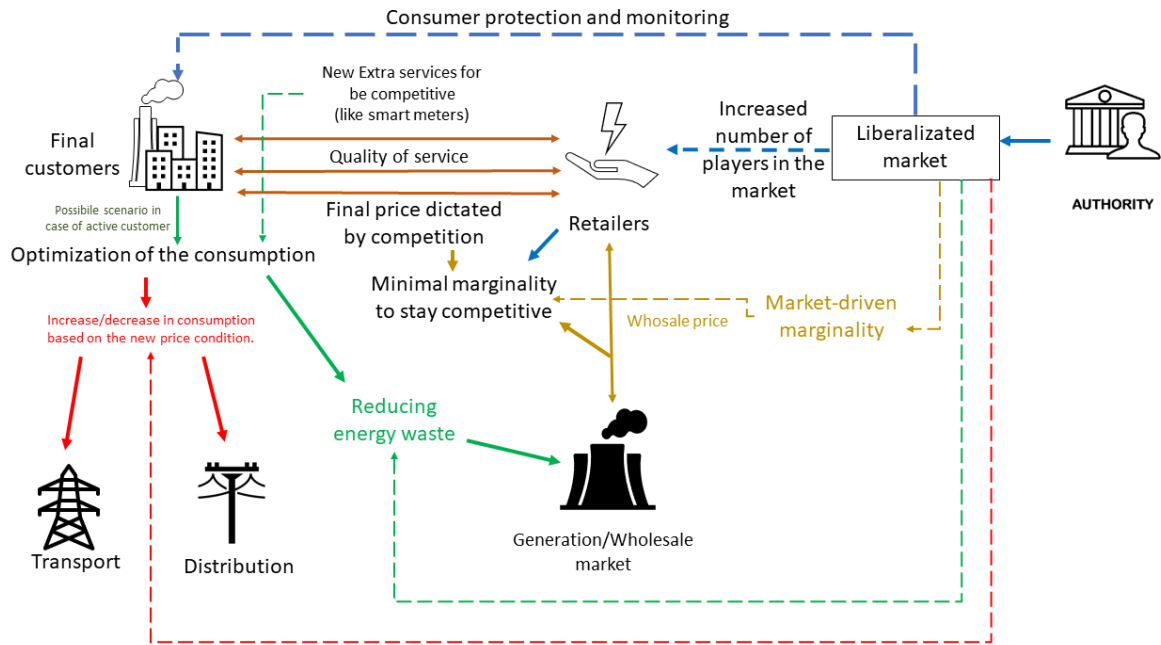


Figure 7 An example of the application of the proposed framework to evaluate the sustainability of the liberalization in the retail energy market

6 Implications and further extensions

As our framework, described in the previous section, shows, the sustainability of policy decisions must include *balancing* different impacts. Focusing on just one of the impacts, perhaps the economic one, at the expense of the others can be counterproductive for the sustainability of the policy in the medium and long term. In-depth studies on *social impacts* that can contribute to a complete analysis of substitutability are still scarce in the literature.

For this purpose, it is important to consider that *genuine sustainability*, according to [78], integrates environmental, sociocultural and economic sustainability understood as dimensions of a single, overarching sustainability that focuses on caring for nature and human well-being. In fact, environmental sustainability is a prerequisite for long-term sociocultural sustainability, and although economic sustainability is only a means of financing the ends of environmental and sociocultural sustainability, the latter two lead to economic sustainability, though not immediately, in the long run. According to [78], *sustainability* is an absolute concept very difficult to achieve. On the contrary, *sustainable development* is a more feasible goal. Of course, we can have sustainability as a goal and work to improve sustainable development.

The energy environment is constantly changing. With our literature review, we delved into the retail market and highlighted the different impacts analyzed in the literature. The most recent works (Gunnarsdóttir et al. (2021)[10], Nastasi et al. (2022)[11]) draw attention to the need to develop

something new on the relationship between the energy retail market and the sustainability of the policies adopted.

The framework described in the previous section provides a solid foundation for discussing the various implications of policies in the retail energy sector by considering the different actors involved and the interactions taking place between them. Our framework also shows the importance to consider and *balance* the different impacts that can ensure *policy sustainability* in the medium and long term.

Gunnarsdóttir et al. (2020) [79] highlighted the need to develop a robust and comprehensive set of indicators to monitor progress toward sustainable energy development and identified six evaluation criteria: transparency of indicator selection and application of indicators, conceptual framework, representativeness, linkages, and stakeholder engagement. Our framework having explicitly developed a comprehensive conceptual structure that highlights most relevant linkages between actors and potential impacts can provide a basis for future analysis and development in the retail energy field. Indicators would need to be developed and contextualized according to the area in which they will be applied to ensure their relevance and policy usefulness. In the contextualization process, greater participation of different stakeholders and consideration of the perspective of the retail energy market, which is very close to consumers, can ensure a better balance between the different impacts that characterize sustainable development.

7 Conclusions and directions for future research

In this study we investigate the topic of the assessment of the sustainability of policy decisions in the retail energy market. A systematic review and analysis of the existing literature allowed us to delve into what has already been done in the past. The identified 48 relevant works are highly heterogeneous but agree on the multidimensionality of the issue and the interconnection among the actors of the system. The systematic review was complemented by a bibliometric analysis that provided useful insights into conceptual relationships among the relevant keywords of the analyzed topic.

We did a critical analysis of existing findings in the literature on the sustainability of policy decisions in the retail energy sector. Too few papers still analyze the sustainability implications.

The added value of the paper is twofold. It consists of the creation of a detailed list of all potential impacts of deregulation and liberalization policies based on existing literature and the development of a comprehensive framework that relates the potential impacts to key players in the retail energy market. The multidimensional and multi-actor *framework* proposed can be useful for policy maker to evaluate all the aspects involved in the policy decision, related to the sustainability in the retail electricity market. This framework may represent a major step forward for the existing literature. The framework consists of five main impacts to be assessed: impact on retailers, impact on consumers, impact on margins, environmental impact, and technical impact. These impacts are detailed through relationships between the different actors in the system. In this paper we have analyzed liberalized, deregulated, transitional and mixed markets. To use the proposed framework in practice, it is necessary to contextualize it with the characteristics of the analyzed market.

As emerged from our analysis, the evaluation of policy decisions in the retail energy market is of fundamental importance. Policy and policymaking are important to this discussion, but it is generally unclear what the policy mix should be to reach sustainable goals for the energy market.

Our systematic review helped us to identify different approaches to assess the impact of policy decisions in different contexts. This study provides the backbone for a new view of the retail market, highlighting its connection with other actors in the market and showing the relationships between them.

In the future, the framework may be expanded by highlighting the views of other markets (e.g., wholesale), a possible extension of the literature involved by snowballing references. A further extension could be to design and develop specific indicators to assess the relationships between the actors identified in the framework as described in the previous section.

The critical analysis of the findings in the existing literature leads us to identify future research directions. Based on the proposed framework of analysis, it would be interesting to further research how sustainability influences policy makers and what categories of impact are primarily considered by policy makers. Another interesting research to be done consists on the analysis of how sustainability supported by policy makers can be a source of competitive advantage for energy retail market players. A useful source of insight would be the analysis of situations where in the absence of policymaker support sustainability is not able to be a source of competitive advantage. And finally, the analysis of the ways in which sustainability impacts on market conditions and the new mechanisms and balances it brings about represents a further area of research to be pursued in future studies.

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Appendix A: Technical details on the systematic review

The following tables contain the keywords and the queries used for searches in Scopus and Web of Science. Tables A and B show the queries carried out at the beginning of the work, on 10th December 2021. Tables C and D reports the queries done for updates on 4th April 2022.

Query Scopus
(TITLE-ABS-KEY (energy OR electricity OR power) AND (TITLE-ABS-KEY (retailers OR retail))
AND TITLE-ABS-KEY (liberalization OR deregulation OR "free market" OR competition OR restructured)
AND TITLE-ABS-KEY (impact OR evaluation OR status)

Table A. Scopus Query, done on 10th December 2021.

Query WOS
All Fields(energy OR electricity OR power) AND All Fields(retailers OR retail)
AND All Fields(liberalization OR deregulation OR "free market" OR competition OR restructured)
AND All Fields(impact OR evaluation OR status)

Table B. WOS Query, done on 10th December 2021.

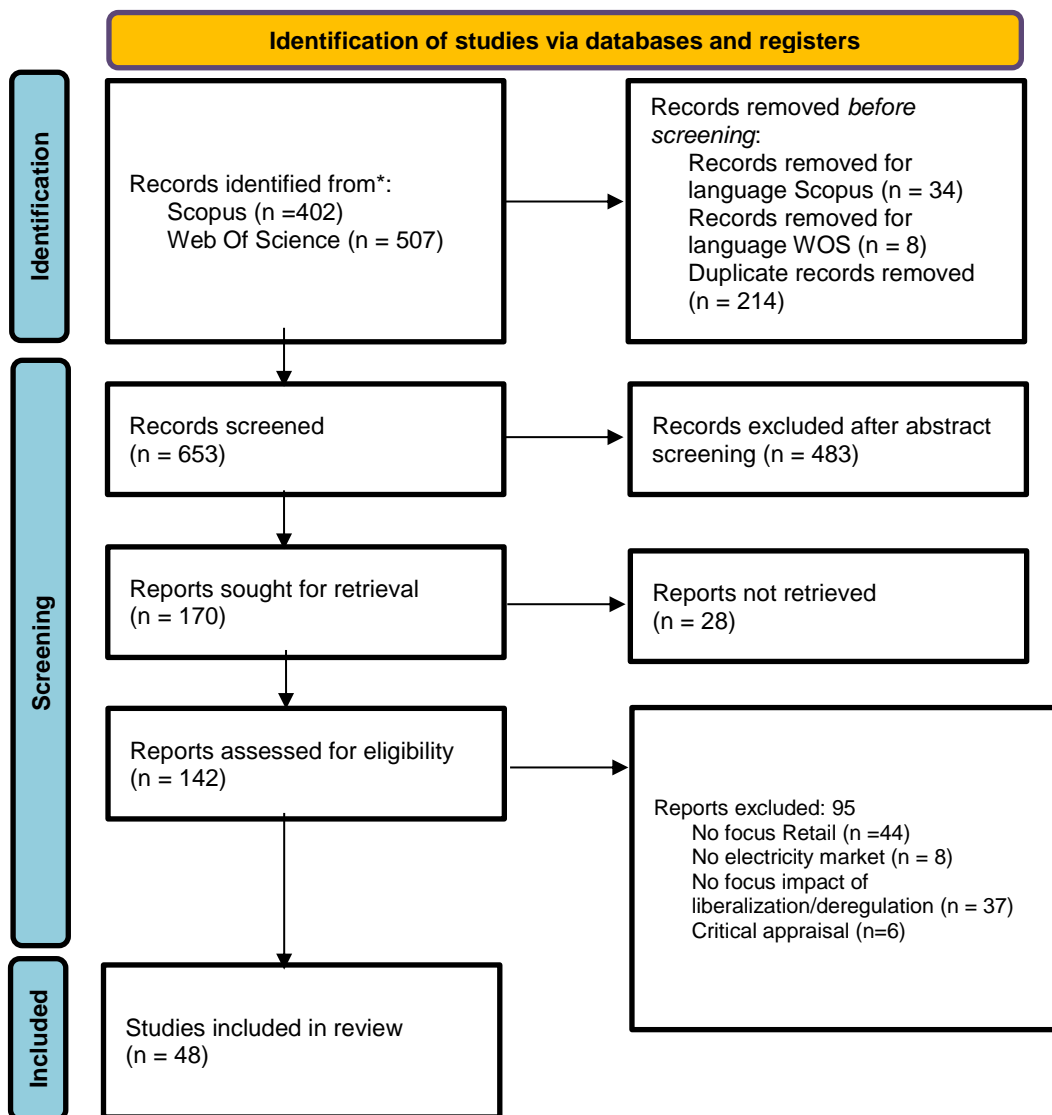
Query Scopus
TITLE-ABS-KEY (energy OR electricity OR power) TITLE-ABS-KEY (energy OR electricity OR power) AND TITLE-ABS-KEY (retailers OR retail) TITLE-ABS-KEY (energy OR electricity OR power) AND TITLE-ABS-KEY (retailers OR retail)
AND TITLE-ABS-KEY (liberalization OR deregulation OR “free market” OR competition OR restructured)
AND TITLE-ABS-KEY (impact OR evaluation OR status)
AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , english))

Table C. Scopus Query, made for updates on 4th April 2022.

Query WOS
ALL=(energy OR electricity OR power) AND ALL=(retailers OR retail)
AND ALL=(liberalization OR deregulation OR "free market" OR competition OR restructured)
AND ALL=(impact OR evaluation OR status)
AND Timespan: 2021-12-20 to 2022-04-04 (Publication Date)

Table D. WOS Query, made for updates on 4th April 2022.

Figure A: PRISMA 2020 flow diagram



Appendix B: Summary of the selected papers

Reference	Scopus Article Classification	Type of market	Country analyzed	Reference year of the study	Intervention (research question)
[27]	Article	Market in transition	Turkey	2004	Evaluation of Turkish electricity reform
[28]	Article	Theory market analysis	Japan	2019	Impact of deregulation/liberalization on the market (theoretical implication)
[29]	Conference Paper	Liberalized market	Europe (28 EU members)	2008-2017	Retail prices against the degree of penetration of renewable energy sources (RES) and market liberalization in each country.
[30]	Article	Mixed market	USA	1972-2009	Impact of Retail Competition on Prices
[31]	Article	Theory market analysis	Singapore	2006-2016	Impact of liberalization on forecasting prices (theoretical implication)
[32]	Article	Market in transition	Israel	2007-2030	Possible evolution of the market after the deregulation and privatization
[33]	Article	Market in transition	China	2020	Business risk on the reformed electricity retail market
[34]	Article	Mixed market	USA	1993-2008	estimates changes in price elasticity in the residential electricity market after market deregulation.
[35]	Article	Liberalized market	Spain	2008-2009	Unintended effects of retail market liberalization
[36]	Article	Liberalized market	United Kingdom	2016-2019	Communication-based interventions to encourage consumer switching
[37]	Article	Market in transition	Ireland	2015	Impact of a fully integrated electricity market
[38]	Article	Market in transition	China	2007	impacts of deregulation of the electricity generation sector and retailing activities on other sectors, the macro-economy and electricity users
[39]	Article	Deregulated market	USA	1998-2001	how the process of retail deregulation affects the comparative efficiency of governance structures, which range on a continuum from fully vertically integrated structures to market transactions.
[40]	Review	Deregulated market	Ohio (USA)	2004-2015	price impacts of retail electric restructuring
[41]	Review	Market in transition	Japan	2009-2014	Impact of the Fukushima disaster and subsequent adjustment on Japanese energy market
[42]	Article	Mixed market	UK and Norway	UK 2003-2010, Norway 2003-2008	Comparison between two liberalized markets but with profound differences related to vertical integration and market concentration and impact of multi-business structure
[43]	Article	Deregulated market	Finland	1997-2006	impact of the ownership structure on prices and the influence of low-cost electricity sources on retail prices
[44]	Article	Deregulated market	New Zealand and the Australian State of Queensland	2000-2011	Impact of deregulation and privatization on the electricity price
[45]	Article	Deregulated market	California (USA)	2012	California's electricity market deregulation process from a subsidy viewpoint
[46]	Conference Paper	Deregulated market	Japan	1978-2014	electricity deregulation affects R&D input of the incumbent electric utilities
[47]	Article	Mixed market	USA	1990-2011	impact of retail competition on prices
[48]	Article	Deregulated market	California (USA)	2001-2011	Impact of electricity deregulation
[49]	Conference Paper	Deregulated market	California (USA)	1990-2018	Impact of Electric Deregulation on Renewable Investments
[50]	Article	Liberalized market	Denmark	2004	Impact of Liberalization on the Electricity Market
[51]	Article	Liberalized market	Japan	2015-2016	impact of liberalization on consumer satisfaction by enabling consumers to choose an electricity provider
[52]	Article	Liberalized market	Europe (25 EU members)	2008-2014	Impact of Liberalization on the Electricity Market
[53]	Conference Paper	Theory market analysis	Theory market analysis	2019	Theory market analysis
[54]	Article	Liberalized market	United Kingdom	2013	critical evaluations of the EU need an internal market for electricity and gas
[55]	Article	Theory market analysis	USA	1998	Regulation impact on restructuring (theoretical implication)
[56]	Article	Liberalized market	China	2020	Impact of retail competition mechanism on information disclosure
[57]	Article	Deregulated market	Pennsylvania (USA)	2008-2010	Analysis of what characteristics of the residential customer and community impacted the decision of whether or not to switch to an alternative electricity provider and when to make the switch
[58]	Conference Paper	Market transition	Japan	2005-2006	Liberalization in the early stages: impact on all actors (companies, consumers and regulators)
[59]	Article	Liberalized market	Theory market analysis	2008	Evaluation of retail competition in electricity market (theoretical implication)

[60]	Article	Deregulated market	Japan	2004-2006	impact of the reform on the retail power market in Japan
[61]	Review	Mixed market	Australia, USA, UK, Canada, Poland, Lithuania, Norway, New Zealand, France, Finland, Sweden, Germany	1990-2012	comparative assessment of electricity market models and evaluation of electricity market organization models based on sustainability criteria and proposal for evaluate the influence of electricity market models on sustainability
[62]	Article	Liberalized market	Italy	2014	local effects and market structure in determining the switching decision in retail electricity markets
[63]	Article	Liberalized market	United Kingdom	2010-2020	Impact of the new reform to inventive the presence of new retailers in UK
[64]	Article	Restructuring Market	Alberta (Canada)	2006-2017	Impacts of default regulated products and their design on the development of competitive retail markets and retailers' pricing decisions.
[65]	Article	Deregulated market	USA	1979-2015	effect of financial leverage on the competitive level and analyzes the strategic behavior of firms under the higher competitive conditions resulting from the U.S. electricity deregulation in the 1990s
[66]	Article	Deregulated market	USA	1990-2014	Impact of market deregulation on price, intensity, and CO2 emissions (interrelationships between wholesale and retail electricity market reforms)
[67]	Article	Deregulated market	Australia	2019-2020	impacts of price regulation (cap) on price dispersion in Australia's retail electricity markets
[68]	Article	Liberalized market	Russia	2014	Impact of market liberalization
[69]	Article	Liberalized market	Australia	1986-1994-1998	Electricity market reform impact
[70]	Article	Liberalized market	France	Post 2011	NOME law impact
[71]	Article	Market in transition	Turkey	2019	Effects of various economic and psychological factors on the switching behavior of large scale electricity consumers. Also impact of possible future liberalization on consumers and retailers
[72]	Article	Restructuring Market	Delaware (USA)	1995-2015	Experience after restructuring
[73]	Article	Deregulated market	Texas (USA)	1998-2008	Impact of market reform on retail rates
[74]	Article	Liberalized market	Australia	March 2020	Examine the relationship between vulnerable and low socioeconomic status customers and switching.