



Sustainable Business Models and IT Innovation: The Case of the REMIT

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Abstract

This paper aimed to explore IT innovations used in sustainable business models in the European single energy market. For this purpose, the academic literature and content analyses of organized marketplaces were performed. The results showed that end users are not always interested in changing the service and try to choose services/resources well known to them. At the same time, market operators see the need for radical change by introducing strategic innovations and digitizing energy markets. Sustainable e-government management models are typically sustained by IoT, blockchain, and smart grid management technologies.

Keywords: Energy Markets; IT Innovation; Sustainable business model; REMIT.



Introduction

Efficient energy markets can provide equal rights for their participants by reducing discrimination and fluctuations in the supply and demand of energy resources (Elmore and Dowling, 2021). Over the last decade, energy technologies and regulations have changed significantly, allowing wholesale trade in renewable energy sources (Telizhenko et al., 2016). There is a tendency to digitize energy infrastructure, use IT innovations, and build smart grids (Sha and Aiello, 2020; Kolosok et al., 2021). At the present stage of development, IT technologies are being implemented for smart grid management, energy distribution and consumption measurement, and solutions to decarbonize the economy (Vakulenko et al., 2021).

Regional transactive energy markets are emerging, where end consumers actively buy and sell energy (Mohy-Ud-Din et al., 2019; Papalexopoulos, 2021). The development of regional energy markets, in turn, is a driver of the rapid spread of renewable energy sources (Lyeonov et al., 2019; Ziabina et al., 2020; Fernandez et al., 2021). The decision-making structure in such systems has changed significantly as it is necessary to balance distributed energy resources to meet local demand (Bahramara et al., 2018).

Economic agents can simultaneously use sustainable business models to achieve environmental, economic, and social goals (Vasylieva et al., 2019; Mendel et al., 2020; Pavlyk, 2020). Moreover, the innovation component is one of the critical categories of such models (Nosratabadi et al., 2019; Lyulyov, Vakulenko et al., 2021). Therefore, this research explores the innovations used in sustainable business models in European single energy market.

This article contains four sections. After the introduction section, the data and methods section describing the research methodology follow. Section 3 contains the main results and discussion. And the conclusions finalize this study in section 4.

Data and Methods

The combined approach in this article was used to study IT innovations used in sustainable business models in the European single energy market. Initially, an analysis of the academic literature on this issue was performed. Thus, the existing concepts of sustainable business models in the energy sector and research gaps were tested.

After that, the authors performed a content analysis of the texts of the websites of organized marketplaces to understand which business models are practice organized marketplaces - considering the obligation of market participants to publicly disclose information on businesses or facilities under Regulation (EU) No 1227/2011 of the European Parliament and the Council (2011) in compliance with organized marketplaces business rules. The general methodology of the study is shown in Figure 1. The list of organized

marketplaces was extracted on August 16, 2021, from the website of the European Union Agency for the Cooperation of Energy Regulators (ACER).

After checking the duplication and inaccuracy of the data, a total of 79 marketplaces were selected. Most of the platforms on the list belonged to the category of “energy exchange” (38 organizations) and “energy broker platform” (36 organizations). Only five organizations fell into the category of “other organized marketplace.” Business registers and transparency registers were used to verify the legal information of marketplaces. Despite a comprehensive approach to the study, official information could not be found on all organizations from the list of marketplaces.

The final stage of the study was a textual analysis of the content collected from the websites of organized marketplaces.

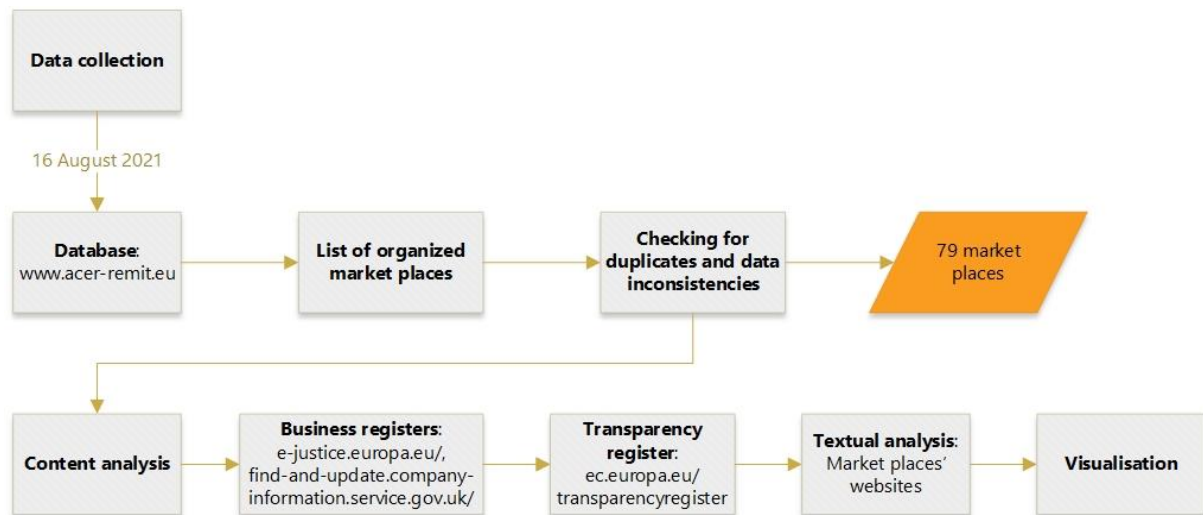


Figure 1. Diagram of the general research methodology

Source: conducted by authors

Results and Discussion

Joint initiatives in the energy sector in Europe have been focused on building a single energy market for several decades. Environmental projects of the day of development of competitive and transparent energy markets are financed and implemented, promoting the European Green Deal (Cebula and Pimonenko, 2015; Paskevicius and Keliuotyte-Staniuleniene, 2018; Gontareva et al., 2020; Ziabina and Kovalenko, 2021; Lyulyov, Pimonenko et al., 2021).

Investing in sustainable development is an essential step towards achieving a carbon-neutral Europe (Chigrin and Pimonenko, 2014; Kendiukhov and Tvaronaviciene, 2017; Lyulyov, Paliienko et al., 2021). The importance of building the existing energy infrastructure in Europe is also unconditional. The integration of existing distributed capacities (including renewable energy sources) into the internal energy market systems remains a strategically important task. However, it isn't easy to find the optimum between the ambitious goals of the EU and the national interests of individual economies.

In the future, investments for European integration should be directed to the harmonization of the operating conditions of the European electricity infrastructure and the rules of balancing gas and electricity (Kolosok et al., 2018; Samusevych et al., 2021; Vasylieva et al., 2021). At the same time, creating organizational, economic mechanisms for disseminating technological innovation in energy is considered a strategic priority for a united Europe (Kozmenko and Vasylyeva, 2008; Salihaj and Pryimenko, 2017; Vasylieva et al., 2018). The diffusion of technologies for active demand management, smart energy use, and energy efficiency greatly impacts the level of development of organizations and the emergence of energy communities (Prokopenko et al., 2017; Vasylyeva, Bilan et al., 2020; Skrynnyk and Vasylyeva, 2020).

Peer-to-peer (p2p) energy communities are becoming more widespread (Duvignau et al., 2021; Iqbal et al., 2021). However, such models are still not widespread (Tushar et al., 2021). According to a study by Plewnia and Guenther (2021), Germany mainly operates virtual p2p communities that stimulate the dissemination of new sustainable technologies. However, despite their capabilities, such business models still do not benefit local energy communities. Montakhabi et al. (2021), in the context of the study of the electricity market in Flanders, emphasize the importance of citizens in the implementation of p2p models. New roles are emerging in the energy market, which requires updating existing business models, analyzing trends, and forecasting scenarios for the interaction of economic agents.

However, new business models also have significant risks associated with their viability (Starchenko et al., 2021; Babenko et al., 2020; Gryshchenko et al., 2022). Renewable energy sources can be pushed out of the market after the abolition of fixed feed-in tariff (Vasylieva, Machová et al., 2020; Vysochyna et al., 2020; El Amri et al., 2021; Štreimikienė et al., 2021). New renewable energy infrastructure models need to be created to be more flexible (Vasylieva et al., 2017; Thomas, 2020) and not distort wholesale prices in the electricity market, especially during peak electricity generation from renewable sources (Rövekamp et al., 2021; Rodchenko et al., 2019). In addition, the current daily pricing model is vulnerable to fluctuations in the prices of distributed energy resources. Intermediate auctions should be conducted based on intraday processes in each regional market to balance prices (Newman and MacDougall, 2021; Kuznetsov et al., 2020; Danylyshyn et al., 2019; Bondarenko et al., 2019).

Despite reforms and liberalization of the EU energy market, falling wholesale prices do not lead to falling retail energy prices for final consumers. Instead, energy prices exceed the average inflation index in Europe (Li, 2018). The results of the Valitov and Maier study (2020) in the German market show the impact of publicly available information on unplanned power outages on the average daily price of electricity on the stock exchange, which contradicts the rules of the REMIT (Regulation on Wholesale Energy Market Integrity and Transparency). In addition, Tesfamichael et al. (2020) emphasize that wholesale trade in electricity is carried out through unsecured communications in modern conditions.

Conclusion

This study aimed to examine IT innovations used in sustainable business models in Europe's single energy market. For this purpose, the analysis of academic literature and content analysis of organized market places was performed. Data for text analysis was collected from several platforms: the ACER, business registers and transparency register, websites of organized marketplaces.

The analysis results show that end users are not always interested in changing the service and try to choose services/resources that are well known to them. There is a need to better inform users and consumers of services about innovative technologies and sustainable business models used in the energy market. Unfortunately, finding information about sustainable business models on corporate service providers' websites is not always possible.

At the same time, market operators see the need for radical change by introducing strategic innovations and digitizing energy markets. It is seen that this will lead to better service for market participants and the gradual abandonment of paper documents. Sustainable e-government management models are typically backed by IoT, blockchain, and smart grid management technologies.

Conflict of interest

The authors declare that no competing financial interests or personal relationships that could influence this paper exist.

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