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Qaisar Mahmood,
COMSATS University, Islamabad
Campus, Pakistan

*CORRESPONDENCE
Anastasia Andreevna Sozinova,
1982nastya1982@mail.ru

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Improving the quality of project management at energytech through marketing in support of sustainable and environmental development of energy economics

Olga Vasilyevna Fokina¹, Anastasia Andreevna Sozinova^{1*},
Anna Gennadyevna Glebova² and Natalia Valeryevna Nikonova³

¹Department of Management and Marketing, Vyatka State University, Kirov, Russia, ²Financial University under the Government of the Russian Federation, Moscow, Russia, ³Department of Accounting and Finance, Vyatka Agrotechnological University, Kirov, Russia

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Introduction

EnergyTech is a promising mechanism through which entrepreneurship can and actively supports the environmental development of the energy economy (Azam et al., 2022; Javed et al., 2022; Li et al., 2022; Tang, 2022). EnergyTech refers to advanced technologies in the energy sector introduced by both energy producers (energy companies) and consumers (urban power supply networks, businesses, and households) (Popkova et al., 2019; Popkova and Sergi, 2021). If urban power supply networks and households are guided by state energy norms, standards, and regulatory measures (and therefore are least subject to change), business is the most flexible subject of the energy economy and a driver of the development of EnergyTech.

The introduction of energy innovations into business activities takes place through project management, which from the standpoint of EnergyTech means the implementation of high-tech investment and innovation projects through production management, personnel management, and quality management (Sozinova and Lysova, 2021; Sozinova et al., 2021). An integrated view of project management in EnergyTech from the standpoint of Stakeholder Theory reveals its contradiction. On the one hand, energy companies are introducing advanced technologies to improve the efficiency of their activities, which may be and often is accompanied by an increase in the environmental costs of the energy economy. On the other hand, the state and society are interested in advanced technologies in the energy sector as sources of sustainable and environmental development of the energy economy.

Such contradictions in Stakeholder Theory are successfully overcome, in many cases, with the help of marketing. In this regard, based on the works of Daifen (2022), Jiménez-Marín et al. (2021), Krishnan and Butt (2022), and Wei et al. (2021), which highlight the

advantages of marketing in EnergyTech, this article hypothesizes that marketing allows to improve the practice of project management in EnergyTech and provide support for sustainable and environmental development of energy economics. The purpose of this article is to explore the prospects for improving project management in EnergyTech through marketing in support of sustainable and environmental development of energy economics.

The role of project management quality in EnergyTech in ensuring sustainable and environmental development of energy economics

The fundamental basis of the research carried out in this article was laid by the scientific concept of EnergyTech as a field of high technologies in the energy economy. Project management at EnergyTech focuses on internal business priorities (Goyal et al., 2014; Sisodia et al., 2020; Štreimikienė et al., 2022; Teichmann et al., 2020), and therefore, this type of management is usually quantified in terms of costs and benefits, as well as their ratio (financial efficiency) (Buah et al., 2020; Martinez and Komendantova, 2020; Onubi et al., 2022).

From a qualitative point of view, the issues of project management in EnergyTech are insufficiently developed, which is a gap in the literature. In the works of Lotfi et al. (2022) and Mora-Villagómez and Reyes-López (2022), it is noted that, during the “Decade of Action,” the quality of project management in EnergyTech should be evaluated from the standpoint of sustainable and environmental development of energy economics, but the issues of formation and improvement of the quality of this type of management need scientific study.

The established approach to project management belongs to the field of internal management (Anastasi et al., 2021; Khan et al., 2022; Qi et al., 2021; Rezaei et al., 2022; Sahoo et al., 2021). This approach ensures that the interests of the business are sufficiently fully respected when managing projects at EnergyTech (Hadini et al., 2021; Ji et al., 2021; Karthick et al., 2021; Vinjamuri and Burthi, 2022). At the same time, the interests of the external environment (society and the state) remain outside project management with the current approach, which is its disadvantage (Garcia-Bernabeu et al., 2019; Storch de Gracia et al., 2019; Hosseini et al., 2020; Izquierdo et al., 2020). The uncertainty of prospects for achieving a balance of internal and external interests (with their equivalence from the standpoint of Stakeholder Theory) in project management in EnergyTech is another gap in the

literature. It seems that marketing can open up prospects for achieving the desired balance, but this requires scientific justification.

Both identified gaps are filled in this article through the study of project management in EnergyTech from the standpoint of quality (in support of sustainable and environmental development of energy economics), as well as the identification of prospects for improving the quality of this management through marketing. The essence of the hypothesis put forward and tested in this article is that quality plays a key role in project management in EnergyTech with a focus on ensuring sustainable and environmental development of energy economics.

Research methodology

The set purpose is achieved and the advanced hypothesis is tested in this paper based on empirical data of 2021 in two successive stages. At the first research stage, the method of correlation analysis is used to determine the significance of marketing for the quality of project management at EnergyTech. The following quantifiable parameters of project management at EnergyTech have been identified and used in the course of research. Firstly, project management results from the standpoint of quality (ISO 9001 quality certificates), production (high-tech manufacturing), and personnel (labor productivity growth) based on the World Bank statistics (2022).

Secondly, the manifestations of sustainable and environmental development of energy economics: GDP/unit of energy use and ISO 14001 environmental certificates, based on the World Bank statistics (2022) as well. Thirdly, the market potential of the economy as a basis for project management at EnergyTech through marketing based on the Global EDGE statistics (2022). The countries of the world are classified according to this criterion, and a separate study was conducted for each category of countries (countries with large and moderate market potentials) to take into account their marketing features when managing projects at EnergyTech.

At the second research stage, the case study method is used for the review and analysis of the empirical experience of project management at EnergyTech through marketing of energy companies in support of sustainable and environmental development of energy economics in Russia. Furthermore, the materials of a survey of CEOs in the energy sector in Russia “CEO Outlook Pulse Survey 2021,” held by KPMG (2022) in 2021, are presented and rethought from the perspective of the quality of project management at EnergyTech.

TABLE 1 Quality of project management in EnergyTech from the standpoint of supporting sustainable and environmental development of the energy economy in countries with different market potentials in 2021. Score: 0–100.

Country category by marketing criterion	Country	ISO 9001 quality certificates/bn PPP\$ GDP	High-tech manufacturing (%)	Labor productivity growth (%)	GDP/unit of energy use	ISO 14001 environmental certificates/bn PPP\$ GDP
Countries with a large (more than 35) market potential	China	31.3	63.1	87.5	17.0	35.5
	India	9.2	43.9	73.9	28.0	5.3
	Singapore	14.0	100.0	56.0	39.9	10.9
	Canada	5.9	48.5	58.9	10.8	2.5
	Japan	15.8	71.8	46.1	34.4	20.3
	South Korea	16.0	77.1	64.0	17.5	16.1
	Germany	28.6	74.6	49.3	38.2	11.5
	Vietnam	9.7	38.2	91.3	18.8	9.3
	Russia	2.8	32.6	63.7	7.9	1.2
	Australia	14.6	31.1	50.9	22.9	11.3
Countries with a moderate (less than 35) market potential	Malaysia	27.8	57.6	55.6	25.8	15.0
	Mexico	7.6	63.5	41.7	35.3	3.9
	UAE	14.5	33.4	52.8	25.7	16.8
	Chile	17.5	30.2	65.6	28.4	12.0
	Italy	94.5	52.9	43.8	44.8	40.1
	Lithuania	40.0	26.1	71.2	33.9	58.7
	Austria	16.7	59.0	50.1	39.3	12.1
	Poland	23.0	41.8	70.8	30.9	17.6
	Brazil	14.4	46.8	65.1	29.1	5.5
	South Africa	11.6	25.7	59.2	10.4	7.5

Source: compiled by the authors based on the materials of the [World Bank \(2022\)](#).

The importance of marketing for the quality of project management in EnergyTech: A view from the perspective of sustainable and environmental development of energy economics

To determine the importance of marketing for the quality of project management, EnergyTech uses the method of correlation analysis. Using this method, the quality of project management is determined as the relationship of project management results from the standpoint of quality (ISO 9001 quality certificates), production (high-tech manufacturing), and personnel (labor productivity growth) with the manifestations of sustainable and environmental development of the energy economy: GDP/unit of energy use and ISO 14001 environmental certificates.

Based on the [Global EDGE \(2022\)](#) statistics, the countries of the world are classified according to the marketing criterion (the value of the market potential index (MPI)), and countries with a

large (MPI more than 35) market potential and countries with a moderate (MPI less than 35) market potential are highlighted. In each category, 10 countries with different levels and rates of socio-economic development, as well as from different geographical regions of the world, were selected from the [Global EDGE rating \(2022\)](#), which made it possible to provide a representative picture of the world economy. To determine the importance of marketing for the quality of project management in EnergyTech, the results of correlation analysis are compared between two categories of countries. The statistical basis of the study is given in [Table 1](#).

Based on the data in [Table 1](#), it was found that the quality of project management in EnergyTech in countries with a large market potential is higher. Thus, the correlation of GDP/unit of energy use in countries with a large market potential was 65.23% compared to 56.27% in countries with a moderate market potential. The correlation of ISO 9001 quality certificates with high-tech manufacturing was 80.71 vs. 69.26%, that with labor productivity growth was 38.55% vs. negative value, and that with

ISO 14001 environmental certificates was 24.23 vs. 22.19%—that is, in all cases, it was higher in countries with a large market potential.

On average, the correlation of project management with sustainable and environmental development of the energy economy in countries with a large market potential was 34.35%, which is significantly higher than that in countries with a smaller market potential (23.18%). Therefore, marketing is important for improving the quality of project management in EnergyTech from the standpoint of supporting sustainable and environmental development of the energy economy.

Practical experience in project management at EnergyTech through marketing of energy companies in support of sustainable and environmental development of the energy economy in Russia

Conducting an in-depth qualitative study of the modern Russian project management experience in the field of EnergyTech of energy companies using the case study method allowed us to identify advanced marketing practices in each component of project management. Environmental marketing is actively developing in production management in Russian energy companies. Thus, according to the KPMG survey (2022) of energy sector managers, these companies consider the environmental risk/risk of climate change to be the most serious (43%).

For example, PJSC “Rosseti” develops solar energy (it has already prepared the infrastructure and power transmission lines to put into operation the Torey solar station). PJSC “RusHydro” develops hydropower (invests in the modernization and development of the Primorye Energy System). JSC “Concern Rosenergoatom” supports employment and develops alternative energy in the regions of Russia (commissioned the sixth unit of the Leningrad NPP) (Energy and industry of Russia, 2022).

In the personnel management system in Russia, personnel marketing aimed at automation for the growth of productivity and labor safety of employees of energy companies is actively used. The most common technologies are production automation (robotics), artificial intelligence, digital communication tools, customer-oriented technologies (chatbots), and data security technologies (cybersecurity) (KPMG, 2022). With the introduction of advanced technologies (that is, the development of EnergyTech), energy companies support work adaptation, training, and retraining of employees with the help of personnel marketing.

In quality management, Russian energy companies implement relationship marketing in corporate environmental responsibility. For example, LLC “Rusatom Infrastructure

Solutions” (part of the State Atomic Energy Corporation “Rosatom”) conducts marketing research and PR of its contribution to the development of EnergyTech with the help of digital marketing, which consists in reducing the level of accidents in power plants, reducing heat losses and improved AI analytics of their causes, improving the quality of operational-dispatching management, increasing the level of energy efficiency, remote data collection and management of heat supply systems, ensuring transparency and efficiency of collection of funds from management companies and the public, and containment of growth of tariffs (Tadviser (2022)).

Discussion

This article contributed to the development of the EnergyTech concept by clarifying the specifics of project management in support of sustainable and environmental development of energy economics. Unlike Buah et al. (2020), Martinez and Komendantova (2020), and Onubi et al. (2022), the authors proposed to evaluate project management in EnergyTech using qualitative rather than quantitative criteria. The essence of qualitative criteria is to determine the degree of compliance of project management with the goals of sustainable and environmental development of energy economics. The relationship of ISO 9001 quality certificates, high-tech manufacturing, and labor productivity growth with GDP/unit of energy use and ISO 14001 environmental certificates is proposed as an indicator for assessing the quality of EnergyTech project management.

In contrast to Garcia-Bernabeu et al. (2019), Hosseini et al. (2020), Izquierdo et al. (2020), and Storch de Gracia et al. (2019), this article suggests a transition from quality management to quality marketing in the management of EnergyTech projects. The advantage of the recommended marketing management is the balance of internal and external interests in project management. This brought project management in EnergyTech in line with Stakeholder Theory. The marketing approach to project management in EnergyTech provides the greatest support for sustainable and environmental development of energy economics.

Thus, the contribution of this paper to the literature consists in the statement of need and the formation of a scientific and methodological basis for improving the quality of project management at EnergyTech in support of sustainable and environmental development of energy economics. The key conclusion of this research is that the improved quality of project management at EnergyTech in support of sustainable and environmental development of energy economics must be based on the marketing methodology. The review and analysis of best international practices, as well as the case experience of Russia in 2021, has shown that the way to improving the quality of project management at EnergyTech lies through the

development and fulfillment of the market potential of the economy.

This paper has provided an integrated perspective on project management at EnergyTech from the standpoint of Stakeholder Theory. A new approach—the marketing approach that has been put forward in this paper—to improving the quality of project management at EnergyTech allows overcoming the contradiction of this management that exists with the current approach (assuming quality management) and achieving a balance of interests of stakeholders and energy markets.

Conclusion

In conclusion, it should be noted that the hypothesis put forward in this study has been confirmed. It is proved that marketing makes it possible to improve the practice of project management in EnergyTech and provide support for sustainable and environmental development of energy economics. This is evidenced by the fact that, in countries with a large market potential, the quality of project management in EnergyTech is 1.5 times higher (through marketing). This is also confirmed by the case experience related to project management in EnergyTech through marketing of energy companies in support of sustainable and environmental development of the energy economy in Russia, which is discussed in this article.

The theoretical significance of the findings made in this study is that they clarified the essence of project management in EnergyTech from the standpoint of quality and also identified prospects for improving the quality of this management through marketing. The practical significance of the results obtained and the recommendations formulated is related to the fact that they

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formed the scientific and methodological basis for the transition to the marketing approach of quality management in EnergyTech, which provides the greatest support for sustainable and environmental development of energy economics.

Author contributions

AS and OF contributed to conception and design of the study. AG organized the database. AS wrote the first draft of the manuscript. OF, AG, and NN performed the statistical analysis and wrote sections of the manuscript. All authors contributed to manuscript revision and read and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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