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IMPROVING THE METHODOLOGY AND MECHANISM FOR STRATEGIZING THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES

Sadullaeva Muslimakhon
Head of business education
ISFT Institute

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Abstract:

The transition from fossil fuels to clean energy sources is a major global challenge, but especially for countries with fossil fuel reserves and economies dependent on fossil fuel exports. Here, we introduce an improved framework for renewable energy planning and decision-making that will help such countries use renewable energy sources more effectively.

Keywords: Use of renewable energy; sustainable performance; corporate innovation; governance; regulation; systematic review.

INTRODUCTION

The world community considers RES, which have great resource potential and are environmentally friendly, to be the most promising way of solving the problem of energy supply. The COP21 UN climate change conference held in 2015 in Paris has largely contributed to the development of RES. Indeed, 195 countries signed an agreement on the global problem of climate change, which committed them to double investment in research on clean energy during the next five years. The Paris Climate Agreement was adopted on November 4, 2016. It mainly aims to sustain global temperature below 2 degrees Celsius above pre-industrial levels and eventually decrease it to 1.5 degrees Celsius. The Agreement encourages these countries to cope with climate changes. These ambitious goals cannot be achieved without flexible opportunities for financing technologies and strengthening relevant institutions according to a level of the country's economic progress (Razumkov Center, 2018). It must be noted that Ukraine was one of the first to join the Paris Climate Agreement and to submit its proposals regarding Intended Nationally Determined Contributions (INDCs). The global economy relies heavily on fossil fuels, which are known to have negative impacts not only on the environment and climate, but also on health (Dincer, 2000; Tietenberg and Lewis, 2016). Fossil fuels currently account for approximately 81% of the world's primary energy consumption (BP, 2017). Although the adequacy of current fossil fuel use is not a concern, their reserves are limited in the long term (Abbaszadeh et al., 2013; EIA, 2017; Alizadeh, 2020, Alizadeh and Lund, 2020). Therefore, clean and efficient energy pathways are of great importance for future energy policies (Alizadeh et al., 2016b; Karbassi et al., 2007; Zamani-Sabzi et al., 2016).

LITERATURE REVIEW

Such changes would benefit from appropriate local and global energy policy planning frameworks. Energy is a vital component of human life, driving both the economy and daily needs [1]. Despite its importance, many countries still rely on fossil energy sources such as oil, coal, and natural gas [2], which negatively impact natural resources and ecosystems. Levitan et al. [3] suggest that increasing the use of renewable energy can mitigate these ecological consequences and reduce dependence on imported fossil fuels. Renewable energy includes solar, wind, bioenergy, geothermal, hydropower, and ocean energy [4], which can improve environmental quality by producing minimal greenhouse gas emissions [5]. The use of renewable energy in businesses and organizations not only helps reduce negative environmental impacts [2], but also provides social benefits such as local economic development, improved air quality, and energy sustainability [6]. Companies can achieve sustainable long-term performance by adopting renewable energy and Triple Bottom Line (TBL) principles. Here, financial success is combined with environmental sustainability and positive societal contributions. Companies can achieve better overall performance by utilizing their unique resources and capabilities wisely, as stated by the Resource-Based View (RBV). Firm performance reflects how effectively a company achieves its goals, efficiently uses resources, and adapts to environmental changes [7,8]. Performance measurement helps management evaluate corporate policies and identify areas for improvement, both in financial and non-financial aspects [8,9]. Firm performance can be evaluated through various metrics, such as profitability, growth, market value, total shareholder returns,

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economic value contributed, customer satisfaction, and stakeholder expectations [10].

MATERIALS AND METHODS

According to Freeman [11], firm performance is "the total value created by the company through its activities, which is the sum of the utility created for each stakeholder of a company". Cherrington [12] adds that a company's performance indicates how well it achieves its objectives.

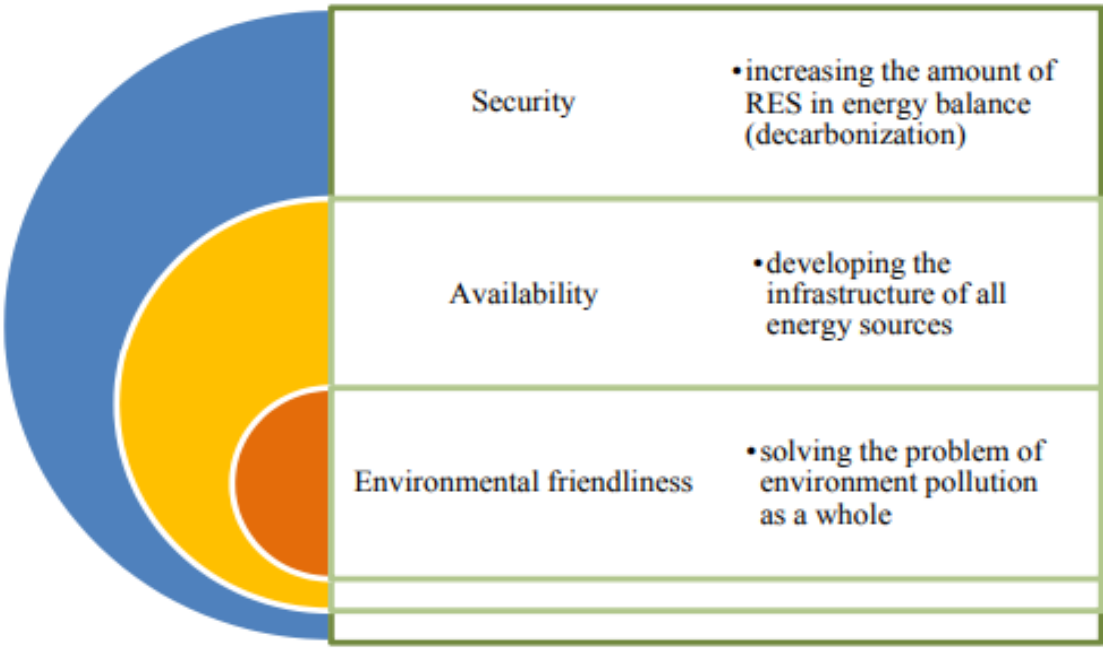

Fig. 1: The main criteria of global energy policy

Energy and climate policy planning frameworks are particularly important for fossil fuel-producing countries, as their economies and economic development are closely linked and locked in with fossil fuels. For example, Iran represents a particularly relevant case in this context, as Iran has the world's 4th largest proven oil reserves and the 2nd largest natural gas reserves (CIA, 2017) and has historically paid little attention to alternative energy development (Dehghan, 2011). Due to increasing domestic energy consumption (6.2% per year over the past decade), an increasing share of fossil fuel exports is being channeled to domestic consumption (Alizadeh et al., 2016b). Consequently, Iran is the third largest consumer of natural gas and is likely to become the largest gas consumer in the near future (BP, 2017). Furthermore, Iran's energy density is very high, or 3 times the world average, and its per capita energy demand is 10 times higher than Japan or the European Union (Alizadeh et al., 2016a; IEA, 2017b). If Iran fails to diversify its energy production, it could become an energy importer in the future (Alizadeh et al., 2016b). Another alarming fact is that Iran is among the leading CO2 emitters, accounting for about 2% of global greenhouse gas emissions (IEA, 2017a). A similar situation exists in other major fossil fuel-producing countries, such as Russia and the Gulf region (BP, 2017). More effective use of local sustainable energy solutions can positively address both climate and economic challenges in fossil fuel-producing countries. However, this also requires changes in national energy policies to better consider clean options in energy planning (Alizadeh et al., 2015a; Azadi et al., 2017; Moshiri et al., 2015). Based on this framework, we aim here to provide a systematic decision support system for policymakers based on multi-criteria decision making (MCDM) in the case of Iran.

RESULTS

We combine the Benefit, Opportunity, Cost, Risk (BOCR) model with the Analytical Network Process (ANP) to integrate strategic planning and decision making.

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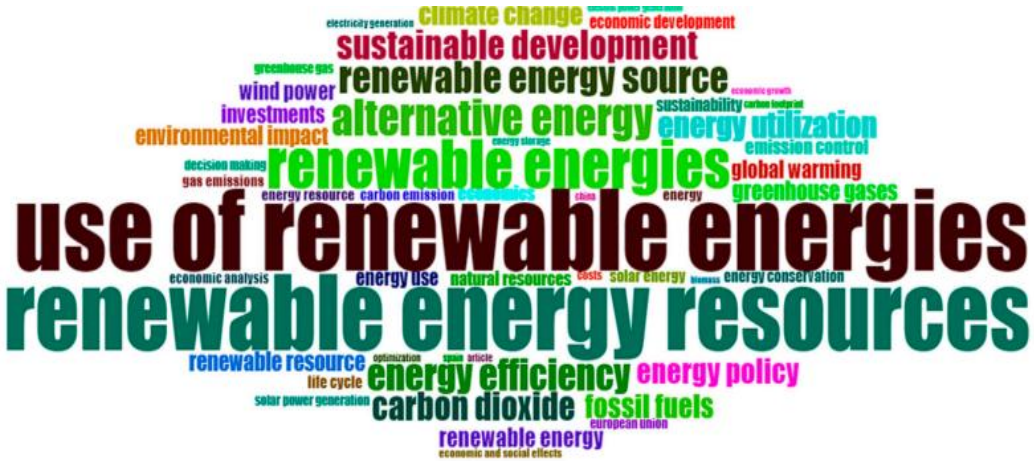

Figure 2. Word cloud highlighting key terms in the use of renewable energy research. Source: author's construct.

Combining BOCR and ANP creates a hybrid model that is ultimately able to overcome the pitfalls of past decision-making processes (Kabak and Dağdeviren, 2014). The BOCR model is a commonly used strategic management framework for decision analysis, in which alternatives, decisions, options, and potential actions are evaluated through four indicators (Li et al., 2009; Saaty and Ozdemir, 2003; Yi et al., 2011). ANP is an applied MCDM method (Saaty, 2004) used to calculate priorities by considering interdependencies. Our proposed hybrid model goes beyond the current state of ANP and BOCR models by addressing two major issues associated with these methods. First, we improve the ability of ANP to identify criteria in areas where similar applications do not exist. Our proposed integrated framework addresses this improvement through six contributions: (i) avoiding arbitrary measurements and determining criteria priorities based on pairwise comparison rates based on decision makers' evaluations; (ii) accounting for tangible and intangible decision variables; (iii) convert qualitative values into numerical values for comparative analysis (Popp et al.); design a simple and intuitive overall process that decision makers can easily understand and apply without specialized knowledge; (v) allow all stakeholders and decision makers to participate in the decision-making process; and finally, (vi) provide feedback and interdependence between criteria (Liang and Li, 2008). A key viewpoint in strategic management, the RBV theory, highlights how a firm's capabilities and resources shape its competitive advantage. The basic idea is that a company needs to have the organizational capacity to absorb and utilize resources and skills that are rare, unique, incomparable, and non-substitutable (VRIN) to gain and maintain a sustainable competitive advantage . The presumptions of this theory also suggest that corporate organizations gain a sustained competitive advantage by applying strategies that take advantage of internal strengths, react to external opportunities, neutralize threats from the outside, and avoid internal weaknesses. Peteraf asserts that the RBV is firmly entrenched in the history of policy research and is consistent with it. The study of strategic management has long been predicated on the notion that organizations are inherently diverse in their internal capacities and resource allocation. This bolsters the claim that the traditional strategy formulation starts with reviewing the organization's capabilities and assets. If an organization is wellpositioned to take advantage of opportunities, it can gain a competitive edge over its competitors.

CONCLUSION

The conducted research proves that the main objective of strategic development for Ukraine is to assure energy security, which is based on the development of RES and to reduce emissions into the environment. This creates new economic and technological challenges for Ukraine and presents new opportunities for discovering and implementing innovative solutions while shaping new policies on energy assurance. The European Energy Community requires that the target should be met by Ukraine is 11% of RES in total energy consumption by 2020, which requires that its own legislative framework for renewable energy should be adjusted to the EU norms and standards. However, Ukraine has a powerful potential of RE, which is more than 98.0 Mill. toe per year. Presently, Ukraine is using only 5%. The EU experience will enable Ukraine to actively develop renewable energy industry relying on the effective legislative framework developed by the leading world experts, as well as the possibility of attracting investments from the EU in RES in Ukraine. Today, the

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following aspects might delay the development of RES in the country: the need for significant initial investments in the construction of new renewable production capacities, remoteness from the networks, possible legislative barriers at the local level, the frequency of production of some RES, the need for production reserves etc. However, the potential of economic, social and environmental effects far exceeds the existence of some problems on the way to implementation.

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