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Research Article

Presenting the Policy Model of Renewable Energy Development for European and Asian Countries

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Abstract
This study presents a policy model to promote the development of renewable energy. The model addresses technical, economic, and environmental barriers in different countries. The geographical diversity of member countries offers an opportunity to establish a stable international network for energy production and distribution. The model enables countries to effectively manage energy supply and demand based on international agreements. It emphasizes the importance of common interests for maintaining stability. Additionally, it highlights the political and financial independence of member countries and aims to reduce reliance on fossil fuels. Based on the systematic approach, the theorizing of this research has been done in three main steps: open coding, Central coding, and selective coding manually and with MAXQDA software. Data analysis in this study includes two parts: qualitative and quantitative. The qualitative part analyzes the interview results. The quantitative part systematically analyzes the data using PLS and SPSS software. In short, the current research is qualitative, its strategy or method: is the Grounded Theory, its approach: is inductive, its purpose: developmental and descriptive, and its data collection method is a semi-structured interview. In this regard, suggestions are made to provide a single international policy for the development and resolution of energy and environmental problems in European and Asian countries.

Keywords Renewable Energies . Energy development models . Policy . Sustainable electricity supply . Peak shaving . Grounded theory

Introduction

Global Significance of the Issue: The growing adoption of renewable energy sources enhances energy security and mitigates the adverse effects of climate change (Idoko et al., 2024). In 2020, fossil fuels accounted for 82% of the world's primary energy supply, a decrease from 86% in 2015 (Rahman et al., 2024). The long-term reliance on fossil fuels is not only unsustainable but

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also detrimental, underscoring the urgent need for comprehensive renewable energy policies (Alizadeh et al., 2020).

Existing Challenges and Gaps: Climate change and energy security concerns demand the development of efficient and renewable energy systems. Policy support is essential for fostering innovation and facilitating the transition away from fossil fuels (Döme, 2024). The implementation of effective models such as Feed-in Tariffs (FiT) and Renewable Portfolio Standards (RPS), as well as addressing regulatory barriers, is crucial (Oduro et al., 2024). Furthermore, governmental support through macro-level policy packages plays a vital role in removing barriers and stimulating market development. Adapting to technological advancements and dynamic global conditions is of significant importance (Ölz, 2011), and increasing investment in renewable energy remains a necessity (Griffiths, 2017). Research Objective and Innovation: This study aims to design a policy model for the development of renewable energy in Europe and Asia (Figure 1) by examining existing policies and influencing factors.

Figure 1. A view of the connection and how the countries join to implement the model of this plan

The model also considers causal conditions, strategic approaches, and policy implications. It is proposed as a solution to bridge existing gaps in electricity networks and the renewable energy sector. The model is based on four key components:

1. Identifying the unique natural energy potentials of each country (e.g., Iran's solar potential).
2. Managing variable electricity consumption and peak loads to reduce the need for high-capita investment.
3. Addressing fluctuations in power plant outputs and the technical limitations of electricity grids.
4. Overcoming the constraints posed by isolated national renewable energy policies.

The significance of this model lies in its potential to resolve renewable energy challenges, reduce environmental pollutants, increase grid capacity, respect national energy policies, and contribute to global peace.

Materials & Methods

Global Outlook on Renewable Energy

Renewable energy is expected to meet up to two-thirds of the world's primary energy needs by 2050. Europe and Asia, particularly countries like Denmark, Germany, China, and India, are experiencing rapid development in solar and wind energy sectors. China plans to add 5,991.6 GW, the U.S. 3,007.2 GW, and India has similarly ambitious targets (Hassan et al., 2024). However, integrating renewable energy into existing power grids presents technical challenges that require advanced control systems, smart grids, and effective energy management strategies. Cross-sectoral collaboration and proactive engagement by policymakers are vital for facilitating this transition (Etukudoh et al., 2024). Figure 2 illustrates the projected increase in renewable electricity generation capacity across global regions from 2020 to 2050 (Ishola, 2024), highlighting the substantial growth expected in Asia and North America, followed by Europe and emerging markets. This upward trend reflects the accelerating global commitment to low-carbon technologies.

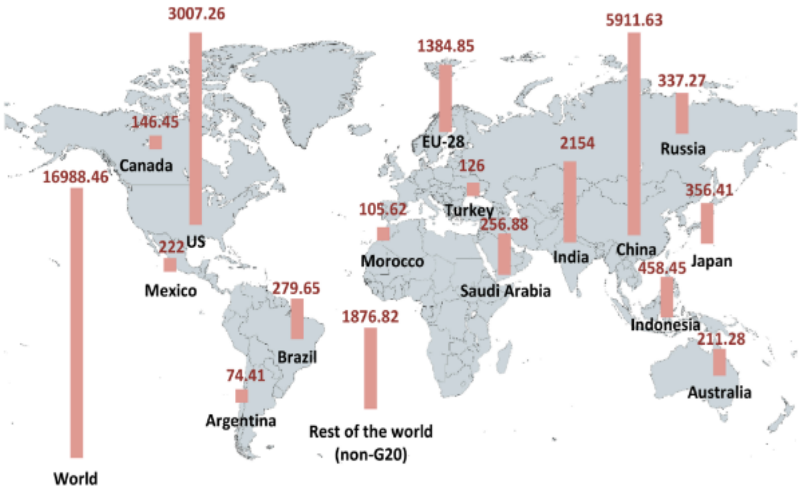

Figure 2. Increased renewable electricity generation capacity from 2020 to 2050 based on regional distribution (Ishola, 2024).

Renewable Energy Policies: Comparative Review

The primary drivers of renewable electricity adoption include environmental sustainability, energy security, cost efficiency, and climate change mitigation (Al-Shetwi, 2022). Technological advancement contributes to lower emissions and fossil fuel substitution (Nunes et al., 2023), although policy mechanisms must continually adapt to rapid technological and economic changes (Deshmukh et al., 2023). Despite structural challenges, clean energy policies remain essential for sustainable development and energy independence (Gatto & Drago, 2021). The effectiveness of these policies depends on context-specific design and implementation. Table 1 presents a comparative overview of selected countries' renewable energy policies, illustrating the diversity of policy instruments, targets, and implementation stages.

Table 1. A comparative overview of selected countries' renewable energy policies.

Country	Policy Instruments	Targets / Results	Remarks
France	Feed-in Tariffs (FIT), tenders	Targets for 2023 and 2028	Investor-friendly framework (IEA, 2022)
Germany	Law amendments, financial support, insurance premiums	Renewable expansion up to 2017	Transition driven by policy (Schlumbohm, 2020)
Sweden	Tax incentives	100% renewable by 2024	Progressive fiscal tools (IEA, 2019)
China	FIT, subsidies post-2005 law	The world's largest renewable deployment	Government-backed acceleration (Luo et al., 2016)
Turkey	FIT, incentives for domestic equipment	Growing solar/wind share	Local content promotion (IEA, 2021)
Iran	Renewable plant development, incentive tariffs	Emerging clean energy policies	The initial stage of implementation (SATBA, 2024)

Policy-Making Models and Approaches

Transitioning to renewable energy also requires effective policy design. Multiple theoretical models explain policy development:

- Laswell's Model (1951): Seven stages-knowledge, promotion, prescription, invocation, application, termination, and evaluation (Jann & Wegrich, 2017).
- Purdon Model: Six steps from problem identification to outcome evaluation (Purdon et al., 2001).
- Common Process Model: Problem definition, policy formulation, decision-making, implementation, evaluation (Gerston, 2014).
- Other Models: Institutional, rational, incremental, elite, group, game theory (Barron, 2024), satisficing (McGuire, 2010), and garbage can model (Mucciaroni, 2012).

The innovation of this research lies in developing a comprehensive and multilayered policy model for the advancement of renewable energy in European and Asian countries. This model simultaneously addresses technical, economic, and environmental barriers while preserving each country's energy development policies independently, tailored to their specific political, economic, and climatic conditions. At the same time, it facilitates regional cooperation and cross-border grid management through international coordination and the establishment of a joint electricity market. This approach combines qualitative Grounded Theory methods with quantitative analyses using MaxQDA, PLS, and SPSS − an integrated methodology rarely reported in previous studies − and facilitates the practical implementation of sustainable and self-reliant energy policies at the international level.

Methodology

This research is based on existing literature and semi-structured interviews with experts (Deering and Williams, 2024). Grounded Theory is applied when there is little to no established theoretical framework regarding the current research. (Holt et al., 2022). There are three approaches in Grounded Theory (Azhari, Afif, Kustati and Sepriyanti, 2023), emergent, systematic, and constructivist (McCall & Edwards, 2021). This research uses a systematic approach with three main stages: open coding, Central coding and selective coding. This is a qualitative study with an inductive approach, developmental and descriptive purpose and data was collected through semi-structured interviews.

Statistical Population and Sampling

The statistical population of this research consists of Iranian experts, university professors, and specialists in renewable energy and electricity policy. Key institutions include the Technology Development Headquarters, the Presidential Transformation and Development Cooperation Center, the Renewable Energy Organization of the Ministry of Energy, the Iranian Renewable Energy Association, and Satka. A combined top-down and bottom-up approach was used. Through snowball sampling, 20semi-structured interviews were conducted, with data saturation reached by the ninth interview but extended to 20 to ensure validity. Most participants were male academic elites and senior managers, 90% of whom held specialized doctorates, with an average of over 23 years of experience.

Data Collection

Semi-structured interviews were the primary method of data collection. All interviews were recorded and transcribed immediately after completion to ensure the reliability of the data. The snowball method helped identify relevant experts, and interviews continued beyond data saturation to increase research rigor. The process was iterative and closely monitored to preserve depth and clarity in qualitative data collection.

Data Analysis

The data were analyzed through qualitative content analysis in three stages: open, axial, and selective coding. Initially, 1300 primary codes were identified, which were refined to 294 and organized into 39 concepts across 12 categories. Coding was performed both manually and using MaxQDA software to ensure accuracy and consistency. The outputs from both methods were compared, and the final coding results are presented in Figures 3 and 4. Figure 3 illustrates the hierarchical structure of the extracted codes, where initial codes are organized into broader concepts and categories. Figure 4 presents a code cloud of the research model, visually highlighting the importance and frequency of the codes and emphasizing the key themes of the study.

Validity of research findings

Data analysis in this study consisted of both qualitative and quantitative interview sections. The data were systematically analyzed using PLS and SPSS software. To ensure validity, interviews with experts continued until the twentieth person. The validity of the research instrument was evaluated using face validity, as well as the Content Validity Ratio (CVR) and Content Validity Index (CVI), ensuring methodological rigor. (Prananto et al., 2022).

Questionnaires were used to measure content validity, and experts evaluated term relevance. Logical validity was measured, and experts provided feedback for amendments. The validity of the measurement instrument was assessed using face validity, content validity, and construct validity. Experts categorized items as "essential", "useful but not essential", or "unessential", and their answers were calculated.

$$CVR = \frac{n_{E-\frac{N}{2}}}{\frac{N}{2}} \quad (1)$$

In the formula, $^{\eta}{}_{E}$ represents the number of experts who chose "essential" and N is the total number of experts. For a sample of 20 people, according to the Lavache table, the minimum relative content validity coefficient is 0.42 (Baghestani et al., 2019). Based on the statistics provided in Table 2, all categories of this research have a validity of over 0.7 and have been confirmed Content Validity Ratio (CVR). All concepts have a validity of over 0.6 and all extracted codes have a validity equal to or higher than 0.5, all of which have been confirmed (Table 3). A Content Validity Index (CVI) above 0.79 confirms content validity. According to expert opinion in this study, all codes had a validity above 0.9, which confirms their content validity.

Table 2. The specialist's opinions regarding 12 research categories (CVR)

Number of categories	Amount (CVR)
3	1
3	0.9
5	0.8
1	0.7

This research used authentic documents and expert opinions for high validity and reliability. Out of 103 respondents, 56 were male and 47 were female, with 7.8% having PhDs. Structural equation modeling (SEM) with Smart-PLS and the Friedman test were used to analyze data.

These analyses provide a strong foundation for understanding research findings and examining models in detail. The study evaluates structural equations in three models: measurement, structural research, and general research models. Table 2 summarizes the content validity ratio (CVR) scores derived from expert evaluations across 12 research categories.

In addition to Cronbach's Alpha and Composite Reliability (CR), Table 4 reports Rho (A) as an alternative indicator of internal consistency. While Cronbach's Alpha assumes equal indicator loadings and may therefore underestimate reliability, Rho (A) provides a more accurate estimate by incorporating the individual contribution of each item. In evaluating the measurement model, reliability and validity were assessed using standard criteria: Cronbach's Alpha values above 0.70, factor loadings greater than 0.40, and Average Variance Extracted (AVE) values higher than 0.50 are generally regarded as acceptable thresholds. The results confirm that all constructs meet these criteria, indicating satisfactory internal consistency and convergent validity. Accordingly, the measurement model is deemed robust and suitable for subsequent structural analysis.

Discriminant validity was evaluated using the HTMT (Heterotrait-Monotrait) ratio. The acceptable cutoff range for HTMT is between 0.85 and 0.90. As shown in Table 5, all HTMT values fall within this permissible range, confirming that the constructs are sufficiently distinct from one another.

Table 3. Content Validity Ratio (CVR) based on specialists' evaluations of the 39 extracted research concepts

Number of concepts	Amount (CVR)
5	1
12	0.9
14	0.8
6	0.7
2	0.6

Table 4. Reliability for the measurement model

	Cronbach's Alpha	Rho (A)	Composite Reliability (CR)
Strategies	0.971	0.976	0.973
Underlying	0.965	0.972	0.968
Causal	0.972	0.980	0.973
Intervening	0.969	0.978	0.972
Central	0.965	0.969	0.968
Consequence	0.971	0.976	0.973

Table 5. HTMT research variables

	Strategies	Underlying	Causal	Intervening	Central	Consequence
Strategies						
Underlying	0.731					
Causal	0.768	0.746				
Intervening	0.614	0.519	0.704			
Central	0.576	0.712	0.321	0.394		
Consequence	0.797	0.746	0.716	0.579	0.786	

The structural model in this research examines relationships between variables using indicators like the VIF, R2, and F2 indices. An acceptable VIF index is below 5, with values close to 1 indicating no collinearity. A VIF value above 5 signifies high multicollinearity. In this study, the highest VIF index is 4.945, which is acceptable. In this study, the R2 and F effect size criteria were analyzed and found to be within the acceptable range.

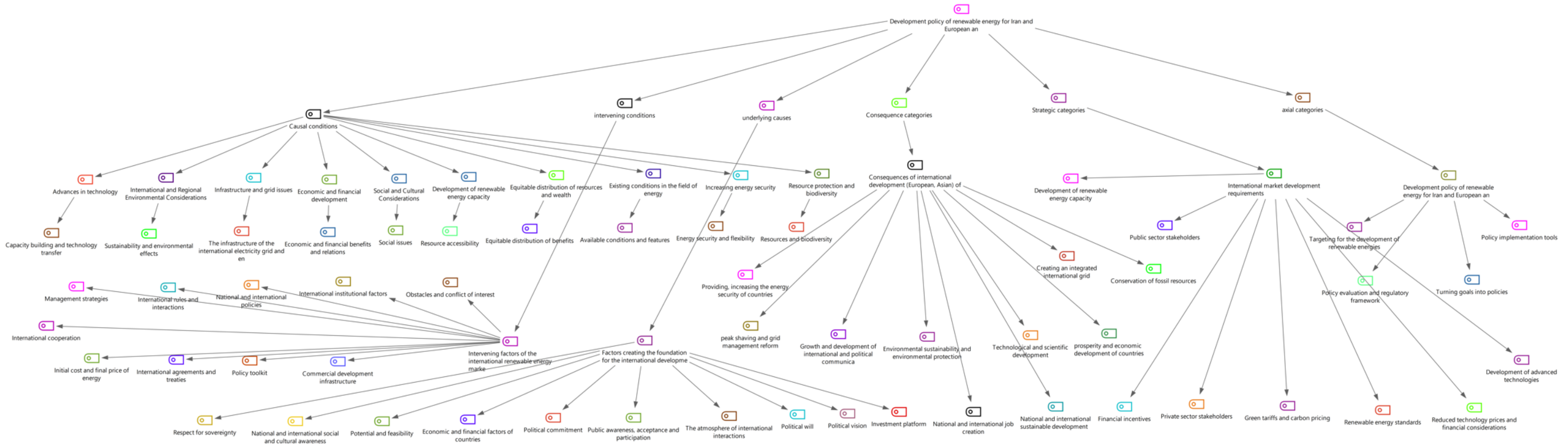

Figure 3. Hierarchical model illustrating the organization of research sub-codes

Figure 4. A view of the code clouds of the research model

The path coefficients were also analyzed to determine the direction and strength of relationships between variables. Positive coefficients indicate direct effects, whereas negative coefficients represent inverse relationships. As illustrated in Figure 5, the estimated path coefficients confirm positive and significant relationships among key constructs.

To assess statistical significance, t-values were compared against critical thresholds. Coefficients with t-values above 1.96, 2.58, and 2.27 are significant at the 95%, 99%, and 99.9% confidence levels, respectively. Figure 6 demonstrates that all structural paths exceed the 99.9% confidence threshold, confirming the robustness of the model. In addition, Table 4 reports the reliability measures, while Table 6 confirms satisfactory convergent validity with all Average Variance Extracted (AVE) values exceeding 0.50. Tables 6 and 7 further establish discriminant validity through the Fornell-Larcker and HTMT criteria, respectively.

Table 6. Convergent validity for the measurement model

	Average Variance Extracted (AVE)
Strategies	0.563
Underlying	0.504
Causal	0.506
Intervening	0.507
Central	0.552
Consequence	0.507

Table 7. Divergent validity (Fornell-Larker) for the measurement mode

	Strategies	underlying	Causal	intervening	Central	Consequence
Strategies	0.750					
underlying	0.477	0.710				
Causal	0.574	0.638	0.711			
intervening	0.676	0.574	0.605	0.712		
Central	0.565	0.477	0.491	0.493	0.743	
Consequence	0.556	0.654	0.502	0.670	0.584	0.712

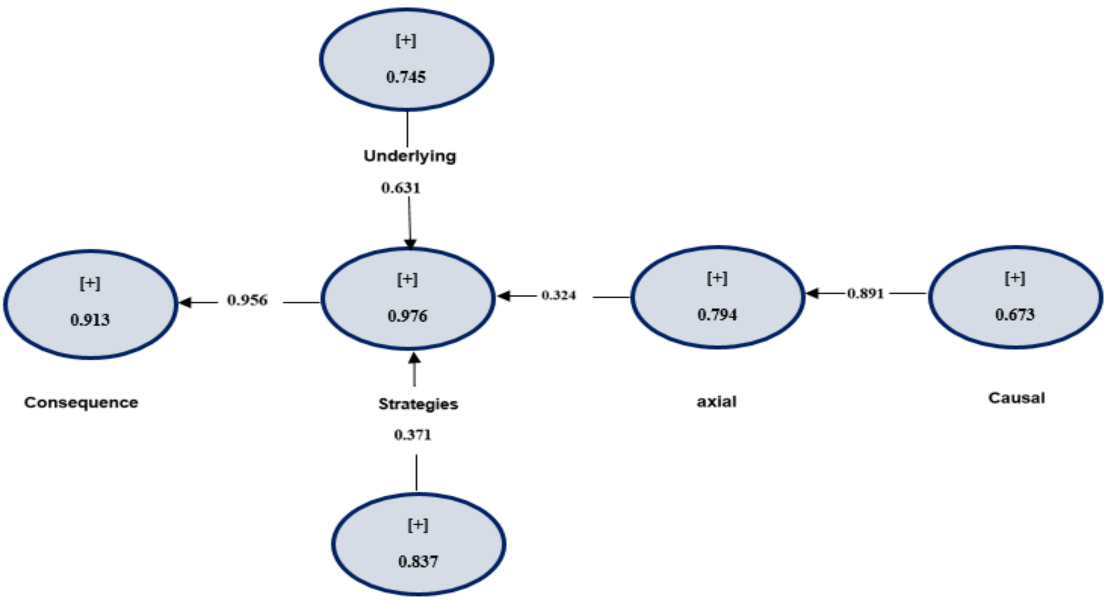

Figure 5. Path coefficients and R2 value

Results & Discussion

The research findings were obtained by analyzing textual data and interviews through open, selective, and Central coding. Based on the extracted categories and concepts, a theory of renewable energy development policy was developed for Iran, European, and Asian countries (Corbin & Strauss, 2015). The result of its coding is presented in Table 8. This table summarizes the main dimensions and components influencing the international development of renewable energy in Europe and Asia. It covers economic, infrastructural, political, technological, social, and policy factors, highlighting key challenges and conditions. This framework helps to understand the complex interactions and supports informed decision-making for sustainable energy development. In the axial coding phase, the category of "Renewable Energy Policy Development in European and Asian Countries" was selected from the open coding phase and positioned at the center of the process under investigation as the core phenomenon.

Table 8. Summary of research findings on extracted Components, concepts, and codes

factors	Components	Concepts	Extractive code
Causal conditions	Economic and financial development	Economic and financial benefits and relations	Economic and financial issues, high initial investment and costs, development of international electricity grid, import and export, support from international banks, appropriate incentives, creation of new jobs, sustainable development.
	Infrastructure and grid issues	Global electricity grid and energy storage infrastructure	Development of international electricity grid infrastructure, possibility of electricity transit, smart grids, access to infrastructure, international dispatching, climate potential, provision of peak load, national dispatching.
	Existing conditions in the field of energy and renewable development	Available conditions and features	Different political challenges and structures, wide scope of the project, lack of political convergence, national dependence on electricity supply, lack of continuity of renewable energies, lack of compliance with standards, the totalitarianism of countries.
	Creating a new market structure	Energy market integration	Efficient allocation of resources, competition among suppliers, reduction of energy prices.
	Environmental considerations and conservation of fossil resources	Sustainability and environmental effects	Correcting global warming, reducing the effects of climate change, land use, water consumption, and habitats, not destroying ecosystems, using renewable energy sources, phasing out fossil power plants, proper resource management.
	Advances in technology	Capacity building and technology transfer	Capacity building opportunities, technology transfer, innovation in technology, cheap electricity generation technology, technology deployment, development.
	Social and Cultural Considerations	Social issues	Social indicators, participation in decision-making, improving quality of life, stakeholder participation, impact on local communities, creating public welfare.
Central categories	Development policy of renewable energy for Iran and European and Asian countries	Targeting for the development of renewable	Regulatory and mandatory policies, international policies, implementation of support policies, policies, and financial participation, formation of a team of international experts, international sanctions.
		Turning goals into policies	Interaction with governments, communication, and determination of the interests of all stakeholders, type of implementation model and pattern,
		Tools for implementation and evaluation of the regulatory	Establishing transparent and enforceable regulatory frameworks, diverse legal systems, institutional capacities of countries, market structures, policies and regulations, guidelines and standards,
Strategic categories	International market development requirements	Development of advanced technologies	Technological capacities of renewable energy equipment, formation and prosperity of regional and international markets,
		Public and private sector stakeholders	Government institutions, international energy agencies and associations, power, and energy equipment industries, investors,
		Reduced technology prices and financial	Energy pricing, production transmission, distribution costs, market liberalization, skilled manpower, operation and maintenance management, creating financial turnover, profitability,
		Financial incentives and carbon pricing	Tax and customs financial incentives, provision and discount of commercial insurance, low-interest international loans, demand for green energy,
underlying causes	Factors creating the foundation for the international development (Europe and Asia) of renewable energies	Political will	Strong leadership, political stability, an atmosphere of international and regional peace and friendship,
		resource potential and feasibility study	Assessing the technical feasibility of integrating countries' networks, transmission infrastructure, climate potential of different regions,
		Political vision and commitment	International political interaction, safe investment, effective international cooperation and agreements, transparent communication channels,
		atmosphere of interactions and regional cooperation	Participatory policy adoption, political approach, coherent global strategy, transparency, international support, political acceptance, strategic planning and governance,
		Economic and financial factors of countries	Financial and non-repayable support, reduced access to international financial resources, customs duties, environmental penalties to reduce emissions,
		National and international social and cultural	Reducing the emission of pollutants, participation, job creation, passive defense, community participation, capacity building, community ownership, social impact assessment,

factors	Components	Concepts	Extractive code
intervening conditions	Intervening factors of the international renewable energy market	International institutional factors	Creating a new consortium, the participation of strong and influential international institutions, independent international institutions,
		laws, policies, agreements, and interactions	International obligations, energy independence, commercial law, the existence of uniform and stable laws and regulations, executive regulations,
		Business development infrastructure based on multi-stakeholder platforms	Creating forums or committees, sharing information, identifying cooperation opportunities, creating a suitable platform for participation, reducing administrative and systemic bureaucracy, strengthening a sense of ownership, meeting needs, strengthening cooperation,
		The international value chain	Equipment manufacturers value chain, technology development value chain, installation and operation value chain,
		Policy toolkit	Determining guaranteed purchase tariffs, supporting research and development, standards,
		Initial cost and final price of energy	Technology costs, political and social approaches, energy costs, production, economic debate, electricity, and road network infrastructure.
		Energy portfolio governance	Regulatory and policy framework, market structure, technological innovation, cultural and social factors, environmental factors, economic factors,
		Obstacles and conflicts of interest and mechanisms for resolving them	Conflict of interests between countries, different goals of the private and public sectors, high initial costs in oil-producing countries, bureaucracy, technological challenges, land use conflicts, necessary education, and skills,
		International cooperation based on transparency and accountability	Transparent communication and responsiveness to regional and national issues, the role of international organizations, addressing global challenges, international security and balance, political relations and biases, agreements between countries, and stakeholder participation,
Consequence categories	Consequences of international development (European, Asian) of renewable energies	Providing, increasing the energy security of countries	Differences in energy sources, supply and demand, potentials and possibilities, increasing energy security, diversifying energy supply sources, efficient energy distribution, sharing countries' climatic,
		peak shaving and grid management	The possibility of connecting national grids, exchanging energy, ensuring grid security, managing supply and demand, electrification,
		Creating an integrated international grid	Grid integration, increasing access to electricity, creating reliable power sources, improving reliability, pooling resources, and increasing the use of renewable energy sources,
		National and international sustainable development	Utilizing the potential and actual potential of countries, developing electricity trade, developing the international market, and reducing costs,
		Environmental sustainability and protection	Reducing ecosystem and environmental impacts, environmental sustainability, reducing greenhouse gases, and impacting environmental indicators,
		National and international job creation	Development of employment infrastructure, including transportation, investment in employment infrastructure, poverty reduction,
		prosperity and economic development of countries	Economic growth and development, reducing market volatility, foreign and domestic investment platforms, governance and macroeconomic issues, income streams,
		Growth and development of global communication	Political growth, social growth, cultural growth, coordination between countries, reduction of energy tensions and contradictions, promotion of peace, Unrestricted electricity supply
		Technological and scientific development	Growth of technical knowledge, growth, and acquisition of technology, development and implementation of standards,
		Conservation of fossil resources	Reducing the capacity of fossil power plants, eliminating fossil fuel subsidies,

Subsequently, the related categories namely causal conditions, strategies, contextual and intervening conditions, and consequences were linked to this central phenomenon. The outcome of this stage, in addition to identifying these categories, was the development of a paradigmatic model for renewable energy policy-making in European and Asian countries, formulated based on Creswell's (2012) framework and presented in Figure 6.

Central coding follows open coding and connects categories and subcategories in new ways (Corbin and Strauss, 2015). In this stage, the category "Renewable Energy Development Policy for Iran and European and Asian Countries" was selected from the open coding stage and placed as the central phenomenon. Causal conditions, strategies, contextual and intervening conditions, and consequences were linked to it, and a paradigm model of renewable energy development policy was drawn (Trotter II, 2012).

Selective coding is the key stage of theorizing. It connects the main categories, refines and re-refines them, and forms a theory based on these relationships. This process finalizes the findings of the previous coding stages and results in a comprehensive policy theory of renewable energy development (Corbin & Strauss, 2015). Figure 6 shows a suitable model for the integrated development of renewable energies in the two continents of Europe and Asia. Table 8 provides details, codes, components, dimensions, and main factors related to this model.

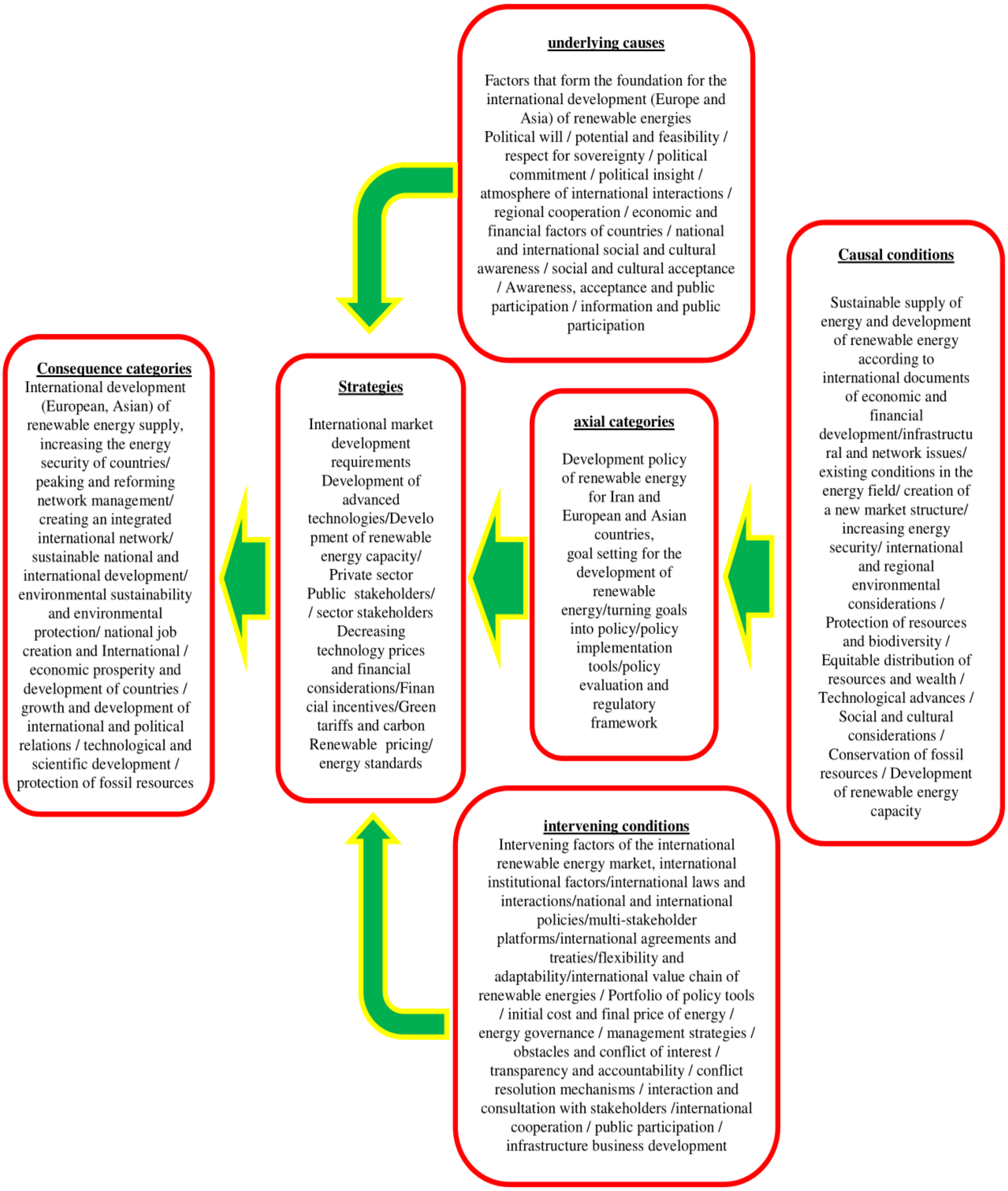

Figure 6. Demonstrating the coding process in the qualitative analysis of renewable energy development policymaking in Iran and European and Asian countries.

Discussion

To operationalize the findings of this research and ensure practical outcomes, the following structured policy recommendations are proposed. Each recommendation is accompanied by the responsible authority or actor for implementation:

1- Establish a Joint Renewable Electricity Market between European and Asian Countries

- Responsible entity: International Energy Agency (IEA) / Regional Energy Commissions
- Action: Create regulatory frameworks and trade agreements to facilitate transnational electricity exchange.

2- Develop Energy Storage Infrastructure in High-Capacity Countries
- Responsible entity: National Governments / Ministry of Energy
- Action: Invest in advanced battery and grid storage technologies to stabilize renewable integration.

3- Form an International Council for Renewable Energy Policy Harmonization
- Responsible entity: United Nations / International Renewable Energy Agency (IRENA)
- Action: Coordinate national policies to create compatibility in regulations, standards, and energy targets.

4- Promote Political Dialogue to Strengthen Energy Diplomacy and Regional Cooperation
- Responsible entity: Ministries of Foreign Affairs / Regional Political Alliances
- Action: Facilitate high-level summits and working groups focused on energy cooperation and conflict resolution.

5- Launch Public-Private Investment Platforms for Renewable Projects
- Responsible entity: International Financial Institutions (e.g., World Bank, ADB)
- Action: Provide risk guarantees and blended finance models to attract private sector participation.

6- Implement Smart Grid and Digital Infrastructure Across Borders
- Responsible entity: National Grid Operators / International Technology Consortiums
- Action: Develop interoperable grid systems for real-time energy management and demand forecasting.

7- Support Developing Countries in Grid Modernization and Market Integration
- Responsible entity: Developed Nations / Global Green Funds
- Action: Offer technical assistance and concessional financing to upgrade infrastructure and policy frameworks.

8- Introduce Dynamic Pricing and Carbon Adjustment Mechanisms
- Responsible entity: National Regulatory Authorities / WTO (for trade alignment)
- Action: Encourage market-responsive pricing to reflect real environmental and economic costs.

Each of the countries plays a role in its place and according to its share and benefits proportionally from this issue. With the realization of the energy portfolio, countries have achieved the benefits of diversifying their energy sources and improving energy security. Alongside this, opportunities for constructive international interactions, conservation, export, and better use of fossil resources have increased in line with promoting international energy diplomacy and income growth. Additionally, the reduction of environmental risks based on regional and international peace will become more apparent. The development of renewable energy on a global scale necessitates effective management of the international power grid and awareness of potential future risks. The proposal suggests that countries with strong political and international ties should adopt this model to promote sustainable electricity and enhance renewable energy capacity. Specifically, by connecting their national power grids to neighboring countries, these nations can collaboratively implement joint measures to achieve the benefits outlined in the study.

Conclusion

This study was conducted with the aim of presenting an international model for the development of renewable energy in European and Asian countries. The research adopts an interdisciplinary approach based on grounded theory, using qualitative data collected from academic and industry experts in Iran's electricity and energy sector. The geographical limitation of relying on experts from a single country may affect the generalizability of the results, highlighting the need for similar studies in other regions.

The proposed model emphasizes regional cooperation, interconnection of national power grids, and optimal use of renewable energy capacities. It seeks to create a framework for policy alignment, utilization of advanced technologies, joint investments, and stakeholder engagement—while respecting national policy independence and ensuring that the interests of individual countries are preserved. Additionally, key factors identified as essential for developing international energy markets include political will, infrastructure capacity, financial mechanisms, and technological readiness. Compared to national approaches that primarily focus on institutional reforms and social justice, this study offers a global model centered on policy synergy and harmonization across countries. The interconnection of national grids enhances energy security, addresses grid load balancing challenges, reduces dependence on fossil fuels, and contributes to environmental sustainability and economic growth.

Importantly, the model ensures that countries retain their sovereignty over electricity supply. It acknowledges that any nation, for various reasons, may choose to disconnect from the international grid and manage its electricity needs independently. However, such a decision would entail forfeiting the broader benefits of regional cooperation.

Given the political and national sensitivities involved, the study recommends that countries with strong political and international ties take the lead in implementing this model. Successful execution will require high-level political commitment, international legal support, and the active participation of key stakeholders. Ultimately, this model represents a strategic step toward a more sustainable, secure, and collaborative future for renewable energy development on a global scale.

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