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Original Article

Factors Driving Farmers' Adoption of Wind Energy Development in Rural Areas of Qazvin County

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Abstract

Purpose- The development of wind energy in rural areas of Iran is a promising solution to achieve the Sustainable Development Goals (SDGs). The purpose of this study is to investigate the factors influencing farmers' willingness and intention to participate in the development and advancement of wind energy. By reviewing the literature and employing an intuitively developed method, the hypothesized influential statements were identified.

Design/methodology/approach- The research sample consisted of 189 participants selected through random sampling. The internal validity of questionnaire indicators was assessed by checking Cronbach's alpha coefficient and loading scores through Principal Component Analysis (PCA). The Cronbach's alpha coefficient fell within an acceptable range.

Finding- The results of the study revealed that externality directly and significantly affects perceived sensitivity (β = 0.40, p = 0.001). In addition, negative externalities have a significant positive effect on perceived severity, with a path coefficient of 0.41 (β = 0.41, p = 0.001). The attitude towards the electricity distribution company also has a direct and significant effect on the willingness to participate in the development of wind energy (β = 0.35, p < 0.001). The functional rationale (β = 0.17, p < 0.05) and the urgency rationale (β = 0.34, p = 0.001) positively and significantly influence the willingness to engage in wind energy development projects. Willingness to participate in development plans has a positive and significant effect on behavioral intention (β = 0.66, p = 0.001). The squared multiple correlations for sensitivity, perceived severity, desire to participate in wind energy development projects, and behavioral intention to participate are 0.16, 0.17, 0.33, and 0.22, respectively (R^2_{Sensit} = 0.16, R^2_{Sever} = 0.17, R^2_{Desire} = 0.33, R^2_{Intent} = 0.22). The results of this survey, in general, indicate that it has an impact on farmers' willingness to promote and develop wind energy. Using the transtheoretical model, it was revealed that the majority of farmers are in the stages of "increasing awareness" and "dramatic relief," while experts are in the stages of "self-reevaluation" and "self-liberation."

Keywords- Renewable, Energy, development, Acceptance, Wind turbine, Qazvin.

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1. Introduction

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Global experience shows that public acceptance of renewable energy technologies, also known as social acceptance, is not favorable. The likelihood that rural people in developing countries adopt such technologies is low (Rezaei and van der Heijden, 2022). The transition to green energies is a gradual, complex, and exhaustive process involving multiple stakeholders and dimensions. The analysis of transitioning to renewable energies (REs) emphasizes the various aspects and characteristics of this intricate process (Omri et al., 2022). Although environmental considerations are less popular, energy dependence on agriculture and the decline of global energy resources are among the important issues in the path of renewed energy development (Sutherland and Holstead, 2014). In connection with the role of REs in the development of rural areas, the synergy between REs and rural development is emphasized, considering them as socio-ecological reforms addressing capitalist crisis tendencies (Clausen and Rudolph, 2020). REs have the potential to thrive in rural areas of Iran due to their environmental, social, and economic advantages. However, they encounter infrastructural, managerial, sociocultural, and economic challenges. The Iranian government has set national goals for the advancement of renewable energy sources in the agricultural sector (Yazdanpanah et al., 2022). The production of renewable energy in the field can lead to increased environmental awareness and sustainable economic and environmental agriculture methods among farmers as well as providing potential economic strengthening to local economies (Sutherland and Holstead, 2014). Based on this, and considering that rural areas in Iran suffer from an unstable energy system, it is necessary to integrate REs into comprehensive development programs, and into rural development programs (Afsharzade et al., 2016).

One of the abundant renewable energies in rural areas and agricultural systems is wind energy. The use of wind energy is still increasing worldwide due to lack of cost in electricity generation (Wall et al., 2021). In deed, attention to the cultural and social dimensions of the ruling in societies is of particular importance in the development of this energy. Evidence suggests that people who wish to adopt renewable energy resources at their place of residence understand a potential market for renewable energy (Sardianou and Genoudi, 2013). On the other hand, there are obstacles to accepting the development of restrictive energy, for example, the perceived personal attitude on the traditional perspective that farmers only need to produce food (Frantál and Prousek, 2016). Farmers primarily produce wind energy to "prove the future" of their farms and increase the long -term economic survival of their farms through trade diversity and investment (Sutherland and Holstead, 2014). Although farmers view the developments of wind turbines at the level of the field as an ideal form of commercial diversity, they consider energy production to be environmentally friendly (Suthherland and Holstead, 2014), in this process, economic issues, including reduced initial investment costs such as value added tax) and energy tax deduction (2023).

In the context of wind energy utilization, emphasis is placed on end-user incentives, as well as infrastructure for information dissemination and technical training (Lew, 2000). Perceptions, beliefs, and acceptance criteria of renewable energy projects vary across different regions (Colmenares-Quintero et al., 2020). Human characteristics, such as intention and willingness to use renewable energy, are crucial for understanding the deployment of renewable energy (Yazdanpanah et al., 2022). The establishment of wind energy projects transforms energy outlooks and daily living environments during the energy transmission process. Regarding the social acceptance of wind energy projects, the role of various aspects of justice like procedural, distributive, and identification) is crucial (Karakislak et al., 2023). Understanding the complex and multidimensional process of energy transfer and social acceptance is a fundamental issue in the expansion and development of renewable energies (Omri et al., 2022). Pro-social orientations were found to be more effective than pro-self-motives in explaining the behavioral intention to use renewable energy technologies among Iranian villagers (Rezaei and van der Heijden, 2022). Achieving sustainable development requires the development of new sources of energy that are clean and inexhaustible (Omri et al., 2022). The insight into the interaction of the determinants for acceptance of the formation of macro and micro policies is of great importance

(Frantál and Prousek, 2016). Due to the production and consumption of REs, no carbon dioxide is released into the atmosphere. This helps reduce healthcare costs, minimize labor loss, decrease dependence on foreign energy sources, and alleviate economic recession (Dinçer et al., 2021). Although technical factors are significant, the economic, institutional, social, and even psychological aspects of transitioning to wind energy should not be overlooked. Although external issues, for example a communication and backup policy related to renewable energy commercialization for farmers, the amount and types of activities related to renewed energy development, geographical and climatic conditions, and the scale of farmlands can facilitate the adoption process of the development of wind energy (Frantál and Prousek, 2016; Moerkerken et al., 2023), it is important to note that people decide to accept or reject the development of wind energy. All these aspects are at the core of environmental economics, institutional economics, and psychosocial approaches (Omri et al., 2022). There is still no research on the extent of the influence of the identified factors on farmers' acceptance of wind energy in Iran. Therefore, the current study, for the first time in the Iranian research system, has investigated the impact of farmers' inclinations and behavioral intentions on the promotion of wind energy in the agricultural sector. There are two approaches to formulate a theoretical basis, one to use the available theories and the second to review the literature, and to spontaneously formulate a theoretical basis, which is called the conceptual framework. The llater has been used in this study. This foundation of the study consisted of variables involving externality, perceived sensitivity, perceived severity, attitude toward participation in wind development projects, attitudes toward the specialists of the regional electricity distribution company, supportive Initiatives, response to urgency, functionalism suitability, development potentiality, and Willingness to participate in the development of wind energy. The study aimed to achieve the following objectives:

(1) Investigating the factors affecting wind energy acceptance by farmers.

(2) Examining the trans-theoretical processes of acceptance in advancing wind energy among farmers, landowners, and experts.

(3) Exploring the difference in variables between rural areas located near wind turbines and those located near fossil fuel electricity plants?

2. Research Theoretical Literature

2.1. Externality

An externality, or side effect, occurs when a company or individual engages in an activity that directly impacts others, another company, or an individual, but does not involve payment or receipt of money. This means that the person or company creating the externality does not include the costs or benefits resulting from the respective action in their calculations. When it is said directly, it is meant to exclude any effect that is transmitted by prices. This effect was known as external effects by Wiener. Indeed, assuming rational pricing behavior, the market is precisely the mechanism that produces a Pareto-optimal (socially optimal) outcome. Externalities are divided into two categories: positive and negative. The former occurs when the activity of the company or person producing the externality increases the utility of the unit affected by it. For example, when a person is creative and offers an innovative idea or product that creates a change in society, they may receive a fee for it, but the positive effects far outweigh the cost. A negative side effect occurs when the actions of a company or individual result in a reduction of the utility of the affected unit. For example, a factory that produces steel. The factory emits smoke from its furnaces into the air, which has a detrimental effect on the surrounding environment, impacting agricultural activities and the health of people in the vicinity.

2.2. Perceived Sensitivity to Air Pollution Risk Derived from Fossil Power Plants

Perceived susceptibility reflects an individual's belief regarding the risk of disease (Witte, 1992). It involves the subjective perception of the likelihood of contracting a disease or experiencing harm and potential damage, which influences an individual's susceptibility to risks (Hsu and Ting, 2020). Personal risk and individual sensitivity are the strongest factors influencing people to adopt health behaviors. It seems logical that when people believe they are exposed to a disease, they are more likely to take measures to prevent it, and vice versa. Perceived sensitivity has a strong cognitive component that primarily depends on individuals' knowledge and awareness.

Suldovsky and Frank (2022) examined the predictors of risk perceptions and environmental values influencing individual-level protective behaviors and civic actions related to air pollution in Portland, Oregon. They concluded that risk perceptions significantly predicted protective behavior. Risk perception is a subjective judgment about the characteristics and severity of risks, often used to assess the potential harm posed by natural, environmental, or health disasters (Hsu and Ting, 2020).

2.3. Perceived Severity of Air Pollution Risk

The perceived severity refers to the seriousness of a particular disease or situation that can have significant consequences on health (Witte, 1992). The severity of the perceived risk refers to an individual's subjective belief that they are exposed to a disease, problem, or injury. Perceived severity includes the risk of potential harm (Hsu and Ting, 2020). If there is a perceived threat of a serious illness with real risks, the likelihood of behavior change increases. This perception varies from person to person. Perceived severity also has a strong cognitive component that depends on a person's knowledge and awareness (Rosenstock, 1974). After examining and internalizing information such as the amount of pain caused by the disease, the death rate caused by it, and the social consequences of the disease (impact on work, effect on family life, and social relations), the individual ultimately forms a perception of the severity of the disease for themselves. According to this assessment, the individual understands the severity of the disease, which motivates them to take preventive measures. The results of a study conducted by Yazdanpanah et al. (2020) show that perceived severity has a positive and significant effect on behavioral intention ($\beta = 0.20$, $p < 0.05$) and actual behavior ($\beta = 0.19$, $p < 0.05$).

2.4. Development Potentiality

Understanding attitudes is crucial when designing policy instruments to motivate action. Attitude is partly socially constructed and, therefore, is studied locally rather than extrapolated from other environments (Xu et al., 2017). Each turbine has the potential to generate a significant amount of electricity (Solar Review, 2024). The results of the survey on public attitudes towards the development of onshore wind farms in southwest Scotland indicate that community ownership leads to greater acceptance of these wind farms. The study conducted in the field of the development of renewable energy technologies and the implementation of new development policies for rural areas of Pakistan indicates the relationship between fossil fuel energy, clean energy, and population in rural areas, energy potential, national policies, and regulations (Raza et al., 2020). A survey conducted in Germany, Austria, Italy, and Switzerland revealed that solar farms and electricity-to-gas infrastructure promote the adoption of renewable energy by local communities. In contrast, wind farms have an ambiguous effect, while gas plants and power lines tend to reduce adoption (Azarova et al., 2019).

2.5. Functionalism Suitability

To maintain the share of REs, the wind energy project must integrate technological, environmental, and social aspects (Langer et al., 2018). About the role of wind energy in achieving the Sustainable Development Goals (SDGs), it has been argued that utilizing clean and affordable energy sources, rather than traditional fossil fuel power plants, offers valuable insights into environmental impacts. In this regard, wind energy plays an important role in achieving goals such as SDG8 for decent employment and economic growth, SDG9 for industry growth, innovation, and infrastructure, SDG11 for the development of sustainable cities and communities, and SDG15 for life on earth. These indicators help reduce operating costs, mitigate climate change and environmental damage, enhance employee participation and morale, bridge learning gaps, establish goals and plans, and utilize resources efficiently (Olabi et al., 2023). Further evidence indicates that a strong synergistic effect exists between renewable electricity prices, SDG7 Affordable and Clean Energy, and SDG12 Responsible Production and Consumption, which explains the majority of the future changes in renewable electricity prices (excluding its effect).

2.6. Response to Urgency

Responding to urgency involves developing efficient and effective solutions for a critical and pressing requirement. Given that fossil fuels are extensively utilized and are non-renewable sources of energy, they will eventually be depleted. After the depletion of non-renewable energy sources, the issue of energy supply will become increasingly complex. Therefore, it is crucial to focus on the production and distribution of alternative

renewable energy sources. Since these energy sources are renewable, they are also inexhaustible. More importantly, they cause little to zero damage to the climate or environment. Fossil fuels, such as oil, coal, and natural gas, are only available in limited quantities. Renewable energies do not emit air pollutants or have few pollutants. It is better for our health. The global increase in fossil fuel-based road transport, industrial activities, and electricity generation, along with the burning of waste in many cities, contributes to the rising levels of air pollution. In many developing countries, the use of charcoal and fuelwood for heating and cooking contributes to poor indoor air quality. According to studies by the World Health Organization, the presence of particles and other air pollutants in the urban atmosphere leads to the premature death of millions of people and results in billions of dollars in health and economic costs. Renewable energies do not affect air quality during operation. Replacing the current fossil fuel-based energy system with a renewable energy-based system is the most urgent and efficient way to address air pollution (REN21, 2019).

2.7. Willingness to participate in the development of wind energy

The desire to understand the emotional and psychological dimensions of a person when performing a behavior is implied. This variable is related to the concepts of desire, affection, and motivation to engage in a behavior. The study shows that willingness plays an important role in explaining the intention of protective behavior. For example, the desire to participate in non-governmental organizations contributes to the formation of behavioral intention to engage in these organizations and saving behavior (Abadi et al., 2018; Abadi et al., 2020).

In connection with the desire to promote the development of wind energy among local communities, the compensation mechanism has been discussed. Findings indicate that households prefer government compensation over private compensation. However, households are less willing to accept government compensation compared to private compensation. This finding indicates that the assessment of local resistance to wind development relies on the compensation mechanism (Garcia et al., 2016).

The conceptualization of desire can take various forms and be related to different topics. For example, Everest (2021) studied the willingness of farmers in the northwestern provinces of Turkey to adopt renewable energies such as solar and wind energy, as well as their readiness to establish renewable energy cooperatives. Out of the participating farmers, 65.88% were willing to establish a renewable energy cooperative. According to this study, 91.34% of the participating farmers were concerned about climate change, and 70.84% were willing to receive education on climate change.

2.8. Attitude toward participation in wind development programs and projects

Studies show that issues of distributive and procedural justice are common factors that influence local public acceptance. In fact, local public preferences are related to various forms of financial and procedural participation. The results indicate that wind energy projects are typically well-received by the local community when specific conditions, such as ownership and extensive participation in the decision-making process, are met. Policy recommendations are proposed for implementing wind energy projects to mitigate local opposition. Deepening the understanding of these issues is of practical importance for the future development of wind energy (Lienhoop, 2018). The willingness to participate in the construction of protective biostructures has a positive effect on attitude.

2.9. Attitudes toward the specialists of the regional electricity distribution company

The evaluation of local people and farmers on the performance of management organizations responsible for technologies and development projects plays a crucial role in disseminating and promoting these technologies and projects. If people are satisfied with the performance of organizations, they are more likely to engage in projects related to those organizations and to sustain their participation in those projects. For instance, evidence suggests that insufficient institutional performance in developing countries hinders wastewater treatment. In contrast, in developed countries, institutional and legal frameworks for wastewater treatment serve as catalysts for the robust implementation of wastewater treatment and recycling policies (Sadeghfam and Abadi, 2021).

2.10. Supportive Initiatives

In response to the question of whether the support declared by political opinion leaders at the local, national, and European Union levels increases the adoption of renewable energy systems, Azarova et al. (2019) studied the behavior of citizens in Italy and Switzerland. The researchers concluded that Italian citizens' decisions are influenced by the opinions of the European Union and national government bodies, whereas Swiss citizens' choices are sensitive to the opinions of local politicians. Some sponsorships take the form of subsidy-based initiatives, advocating for the higher price of green energy technology with government subsidies in resource-poor countries (Elahi et al., 2021). The governmental support, through policies, infrastructure development, and financial incentives, fosters the success of disseminating small-scale wind turbines and also provides support (Lew, 2000). Local leaders play a crucial role in the development of renewable energy by sharing profits and taxes from companies with the central government. They also wield significant power over property rights and revenues.

2.11. Trans-theoretical model

The use of process-oriented models, such as the trans-theoretical model, plays an important role in conceptualizing the process of changing farmers' behavior. The trans-theoretical model can accurately describe the stages involved in farmers' decision-making process to adopt and implement environmental behaviors. This model establishes a framework for assessing farmers' readiness to change their behavior, enabling tailored interventions based on their readiness level. This model includes stages of change, decision-making balance, self-efficacy, and change processes. The stages of behavior change structure are central to this model because it is the only structure that incorporates a time dimension. Behavior change consists of five stages of change, which include pre-contemplation, contemplation, preparation, action, and maintenance. The first three stages represent the individual's intention to change, which are formulated in their mind, while the last two stages involve the transformation of behavioral intention into visible actions. At the initial stage, the individual has not yet seriously considered changing their behavior. During the contemplation stage, the individual actively considers changing their behavior. During the preparation stage, the individual is committed to making a change in the near future, typically within the next month. In the action stage, the individual actively changes their behavior, and in the maintenance stage, the newly established behavior continues and becomes ingrained. However, one should be cautious not to regress to previous stages. The stages of behavior change in the trans-theoretical model are: (1) Pre-contemplation, (2) Contemplation, (3) Preparation, (4) Action, and (5) Maintenance. Ten change processes have been identified to enhance decision-making balance, self-efficacy, and motivation. These processes are outlined on www.pmhealthnp.com.

(1) Increasing awareness involves discovering and learning new facts, ideas, and tips that support healthy behavioral changes.

(2) Dramatic Relief: Experiencing negative emotions, such as fear, anxiety, and worry that accompany unhealthy behavioral risks.

(3) Self-reevaluation: Understanding that changing behavior is an important aspect of one's identity as a person.

(4) Environmental reappraisal involves understanding the negative impact of unhealthy behavior or the positive impact of healthy behavior on one's social and physical environment.

(5) Self-liberation: a decisive commitment to change.

(6) Helping Relationships: Seeking and Using Social Support for Healthy Behavior Change

(7) Reciprocal conditioning involves substituting healthier alternative behaviors and cognitions for unhealthy behaviors.

(8) Contingent management involves increasing the reward for positive behavior change and decreasing the reward for unhealthy behavior.

(9) Stimulus control involves removing cues that trigger unhealthy behaviors and adding cues that promote healthy behaviors.

(10) Social Emancipation: Understanding that social norms are evolving to promote healthy behavior change.

3. Research Methodology

3.1. Wind Energy Site

The survey was conducted in four townships in the Qazvin province: Qazvin, Takestan, Abyek, and Alborz. The Kahak area is the first place where wind turbine plants were installed. It is situated 8 kilometers from Takstan and 34 kilometers southwest of Qazvin city, the capital of the

province. One of the most significant and largest wind farms in Iran is located in this village. The people in this region engage in agriculture and animal husbandry, producing grapes, corn, alfalfa, and sugar beets as their main products. Additionally, the villagers engage in animal husbandry. Women are engaged in these activities alongside the men of the village and are also involved in the preparation and processing of grape juice and tomato paste.

3.2. The sample and the studied population

The population studied in this research includes all the farmers in townships, including Qazvin, Takestan, Abyek, and Alborz, with suitable potential for investing in and building wind power plants (wind turbines). A sample of 189 farmers was randomly selected and surveyed.

3.3. Data Collection

The data collection tool included a web-based questionnaire and a paper questionnaire. The questionnaire items were developed based on Bandura's cognitive model (Thøgersen and Grønhøj, 2010). In the organizational support section, the organizational support model of Eisenberger et al. (1986) was adapted.

3.4. Data Analysis

Path analysis was conducted using AMOS software (IBM: version 24) to analyze quantitative data.

Table 1 displays the constructs and indicator variables that were included in establishing the causal model.

Table 1. The constructs and indicator variables that were included in establishing the causal model.

Explain	$\bar{x}$ ±SD	Loading Score	Explained Variance (%)[a]	Cronbach's Alpha
Externality ($\xi 1 \rightarrow \eta 1$)	3.90±0.71		46.92	0.66
Reduction in leaf area, biomass, and nitrogen content	3.90±1.05	0.670		
A decrease in the yield of agricultural products	4.15±0.99	0.617		
A decrease in income	3.94±1.03	0.774		
Adverse effects on vegetation (flora) and wildlife species (fauna)	3.59±1.10	0.669		
Perceived Sensitivity ($\xi 2 \rightarrow \eta 1$)**:** How likely is air pollution from fossil power plant to have negative effects on	3.57±0.62		34.55	0.74
your health?	3.85±1.17	0.854		
on agricultural crops, such as reducing their yield, leaf area, and biomass?	3.79±1.25	0.735		
income from agricultural sector?	3.34±0.98	0.791		
plant and animal populations?	0.94±3.30	0.522		
Perceived Severity ($\xi 3 \rightarrow \eta 1$) The risk of air pollution caused by fossil fuel power plants is:	3.43±0.69		45.32	0.96
a very serious concern for my health.	3.79±1.23	0.724		
a significant concern for agricultural products.	3.30±0.90	0.745		
a serious threat to farm income.	3.23±0.96	0.529		
Wind Energy Potentiality ($\xi 4 \rightarrow \eta 1$)	3.40±0.75		43.43	0.92
Wind energy has the potential for further development to generate and supply energy to the power grid.	2.96±1.10	0.505		
Wind energy has the capacity to further expand and create job opportunities.	3.31±0.99	0.457		
Wind energy has the potential for further development through investment from the public sector.	3.57±1.29	0.791		
Wind energy has the potential for further expansion through private sector investments.	3.79±1.19	0.806		
Functionalism Suitability ($\xi 5 \rightarrow \eta 1$)	3.64±0.93		60.07	0.78
The function of wind energy is directly related to ecological factors.	3.68±1.29	0.890		
The operation of wind energy is proportional to ensuring universal fairness for all consumers.	3.69±1.20	0.799		

Explain	$\bar{x}$ ±SD	Loading Score	Explained Variance (%)[a]	Cronbach's Alpha
The function of wind energy is related to the fair distribution of energy among suppliers.	3.56±1.13	0.609		
Response to Urgency ($\xi 6 \rightarrow \eta 1$)	3.62±1.03			
The pollution resulting from fossil plants increases the necessity of using wind energy in electricity production.	3.68±1.38	0.753	62.36	0.89
Climate change, stemming from the rise in fossil fuel consumption, has made it imperative to harness wind energy for electricity generation.	3.79±1.23	0.787		
The increasing urban population underscores the importance of utilizing wind energy in electricity generation.	1.41±1.30	0.828		
Attitudes towards participation in wind turbine development programs and projects ($\xi 7 \rightarrow \eta 1$)	3.17±0.85		47.60	0.94
The participation of villagers in the development of wind turbines involves leveraging local expertise and knowledge.	2.96±1.20	0.786		
The participation of villagers in the development of wind turbines increases their responsibility for renewable energy production.	3.17±1.31	0.662		
The involvement of villagers in the development of wind turbines increases their responsibility for producing renewable energy.	3.16±1.24	0.772		
The involvement of villagers in the development of wind turbines enhances the eligibility for government financial assistance for villages.	3.42±1.21	0.503		
Attitude toward the electricity distribution company ($\xi 8 \rightarrow \eta 1$)	3.40±0.70		39.46	0.70
Officials take into consideration the opinions of the villagers when making decisions about clean electricity production.	1.20±3.51	0.683		
Officials are working to organize farmers and villagers to revive energy cooperatives and expand the production of clean electricity.	1.18±2.88	0.812		
Officials perform their duties based on the needs of rural areas.	1.29±3.52	0.699		
The officials are addressing the air pollution issues in the region by installing wind turbines.	1.13±3.72	0.568		
Supportive Initiatives (Organizational Support) ($\xi 9 \rightarrow \eta 1$)	3.39±0.83		41.45	0.92
If the managers and officials support wind energy development, the likelihood of my involvement in the wind energy project increases.	3.50±1.22	0.483		
If my friends and family support wind energy development, the probability of my participation in the wind energy project increases.	3.40±1.25	0.698		
If neighboring farmers support wind energy development, the likelihood of my involvement in the wind energy project increases.	3.21±1.36	0.723		
Willingness to Participate in wind energy programs and projects ($\eta 1 \rightarrow \eta 2$)	3.68±0.94		71.43	0.98
I like to participate in consultation meetings with experts from the electricity distribution company.	3.70±1.16	0.856		
I would like to encourage other villagers to participate in the development of wind turbines.	3.74±1.08	0.799		
I am eager to contribute to the maintenance and development of wind turbines.	3.69±1.11	0.830		
I wish to collaborate with local rural organizations for the development of wind turbines.	3.63±1.11	0.893		

Explain	$\bar{x}$ ±SD	Loading Score	Explained Variance (%)[a]	Cronbach's Alpha
Behavioral Intention (η2)	2.99±0.58		33.17	0.84
My intention is to participate in the development planning of wind turbines in the near future.	3.53±1.15	0.828		
My intention is to encourage the villagers to participate in setting up a wind energy cooperative or union in the near future.	2.95±1.06	0.717		
I have planned to participate in the management and protection of the wind turbines once their construction is completed.	3.81±1.13	0.809		
I strive to address issues that arise from diverse individuals, both local and non-local, throughout the project implementation.	2.28±1.27	0.684		
I will provide the trustees with the necessary land for installing wind turbines.	1.99±1.10	0.517		
I am willing to pay a premium for electricity generated through wind turbines to support this industry.	2.20±1.18	0.699		

Note: The dimension reduction method calculates the amount of variance explained in the model through Principal Component Analysis (PCA). Rotation is a crucial step in PCA, where the coordinate system for the principal components is adjusted to improve the interpretation and understanding of these components. Principal components are determined through Principal Component Analysis (PCA) on a dataset, considering the correlation pattern among the main variables.

4. Research Findings

4.1. Path Analysis

It is generally assumed that there is no high correlation between predictor variables when implementing the linear regression model. Before conducting the path analysis, it is essential to examine the relationships between predictor variables in the model. The indices used for this purpose are the Variance Inflation Factor (VIF) and the Tolerance Index. The threshold point for the VIF index is less than 10. Moreover, for the tolerance index, the threshold point is greater than 0.20. The results of running the linear regression model showed a variance inflation factor (VIF) index value, as presented in Table 2.

Table 2. The results of linear regression for assessing variance inflation factor and tolerance index

	VIF	Tolerance
Externality	1.43	0.70
Perceived sensitivity	1.48	0.67
Perceived severity	1.51	0.66
Development Potentiality	2.40	0.41
Functional Suitability	1.33	0.74
Response to Urgency	1.04	0.96
Attitudes towards participation in wind energy development projects	1.17	0.85
Attitude towards the electricity distribution company	1.15	0.86
Willingness to participate in the development of wind energy	1.03	0.96

Note: Multi-collinearity indicates a high correlation between predictor variables in a linear regression model. To ensure that this phenomenon does not compromise the model analysis, two indices are utilized: The Variance Inflation Factor (VIF) with a cutoff of less than 10 and a tolerance index higher than 0.20 (VIF =1 / Tolerance. Since path analysis involves a set of regression functions, the two indices mentioned above are commonly used to evaluate regression functions by default.

4.2. Measurement Model of Path Analysis

As derived from the initial measurement model, the evaluation of the conceptual model fitting criteria revealed that the model's goodness of fit was unsatisfactory. This indicates that the conceptual model does not align well with the dataset obtained from the survey of the respondents. The results show that the goodness of fit indices of the model is as follows: CMIN = 510.66, df = 63, CMIN/df = 8.10, CFI = 0.13, TLI = 0.14, IFI = 0.32, RFI = 0.13, NFI = 0.29, indicating the inappropriate fit of the studied conceptual model. The root-mean-square error of approximation (RMSEA) is 0.19, indicating that the conceptual model was poorly

fitted. To enhance the measurement model, significant covariance structures between the exogenous variables were established. This adjustment was made to improve the fit indices of the measurement model. The results of examining the criteria for fitting the conceptual model showed that the model's goodness of fit was satisfactory. The conceptual model showed a good fit with the dataset obtained from the survey of the respondents (CMIN = 87.10, df = 42, CMIN/df = 2.07, CFI = 0.93, TLI = 0.87, IFI = 0.93, RFI = 0.77, NFI = 0.88, RMSEA = 0.07). The RMSEA index also indicates that the fitting of the conceptual model has been done properly.

4.3. Structural Model of Path Analysis

As demonstrated in Table 3, externality directly and significantly affects perceived sensitivity ($\beta_{Extern \rightarrow Sensi}$ = 0.40, p = 0.001). In addition, externality has a significant positive effect (with a path coefficient of 0.41) on perceived severity ($\beta_{Extern \rightarrow Severi}$ = 0.41, p = 0.001). The attitude toward the electricity distribution company also has a direct and significant effect on the willingness to participate in the development of wind energy ($\beta_{Atti \rightarrow Willing}$ = 0.35, p < 0.001). The functional reason ($\beta_{Functiona \rightarrow Willing}$ = 0.17, p < 0.05) and the urgency reason ($\beta_{Urgency \rightarrow Willing}$ = 0.34, p = 0.001) positively and significantly influence the willingness to engage in wind energy development projects. Willingness to participate in development projects has a positive and significant effect on behavioral intention ($\beta_{Willing \rightarrow Intent}$ = 0.66, p = 0.001). It is noteworthy that perceived severity has a significant negative effect on behavioral intention ($\beta_{Severi \rightarrow Intent}$ = – 0.44, p = 0.001). This finding indicates that the higher the perceived risk of air pollution resulting from electricity generation by fossil power plants, such as those using diesel fuel in the region, the lower the behavioral intention formed. This issue arises because cognitively and perceptually, the perception of risk severity is appropriately assessed. However, this does not translate into the development of an inquisitive and proactive mindset, such as behavioral intention or actual behavior. This issue highlights a person's indifference towards air pollution. Farmers may believe that this issue is not relevant to them or that they cannot influence the pollution situation. Apathy may occur when the problems of life, family, communities, country, and the surrounding world seem so overwhelming that one feels powerless to address them and make a difference. Indifference is a state in which we do not care or take action on what is happening around us. Indifferent people can be seen as disinterested, unmotivated, and lacking enthusiasm (Buckle, 2024). The prediction rates of the dependent variables (squared multiple correlations) for sensitivity, perceived severity, desire to participate in wind energy development projects, and behavioral intention to participate are 0.16, 0.17, 0.33, and 0.22, respectively (R^2_{Sensi} = 0.16, R^2_{Severi} = 0.17, $R^2_{Willing}$ = 0.33, R^2_{Intent} = 0.22).

Table 3. Maximum Likelihood Estimates, Standardized Regression Weights, and Critical Ratio

			Estimate (βs)	S.E.	C.R	P-value	Confirmed
Externality	→	Sensitivity	0.40	0.058	6.181		Yes
Potentiality Reason	→	Willingness	–0.11	0.100	–1.417	0.157	No
Functionalism Reason	→	Willingness	0.17	0.084	1.996	0.046	Yes
Response to Urgency Reason	→	Willingness	0.34	0.079	3.896	0.001	Yes
Attitude Toward Participation	→	Willingness	0.10	0.065	1.744	0.081	No
Company Electricity	→	Willingness	0.35	0.082	5.601	0.001	Yes
Externality	→	Severity	0.41	0.065	6.176	0.001	Yes
Supportive Initiatives	→	Willingness	–0.02	0.065	–0.355	0.723	No
Sensitivity	→	Willingness	0.004	0.233	0.026	0.979	No
Willingness	→	Intention	0.66	0.050	8.306	0.001	Yes
Urgency Reason	→	Intention	–0.01	0.039	–0.223	0.824	No
Severity	→	Intention	–0.44	0.141	–2.664	0.008	Yes
CMIN = 87.10, df = 42, CMIN/df = 2.07, CFI = 0.93, TLI = 0.87, IFI = 0.93, RFI = 0.77, NFI=0.88, RMSEA= 0.07 R^2_{Sensi} = 0.16, R^2_{Severi} = 0.17, $R^2_{Willing}$ = 0.33, R^2_{Intent} = 0.22							

Note: The unstandardized path coefficients are obtained by dividing the regression weight estimate by the estimate of its standard error. The critical ratio (CR) is then calculated. The resulting value indicates the number of standard error units by which the regression weight estimate is above (+) or below (–) zero. The effect size of the model is measured by a formula Cohen d $= \frac{R^2}{1-R^2}$.

4.4. The Perceived Denotation of Wind Turbines

In connection with the respondents' interpretation of wind turbines, the interpretive method was used to design the desired items. The results of the descriptive statistics analysis showed that the respondents attributed the most significance to wind turbines as an "electricity generating machine" (n=125, 66.1%) (See Figure 1). There is a significant difference in the connotative meanings of intention; therefore, the highest mean score for intention is at the epitome of purity level.

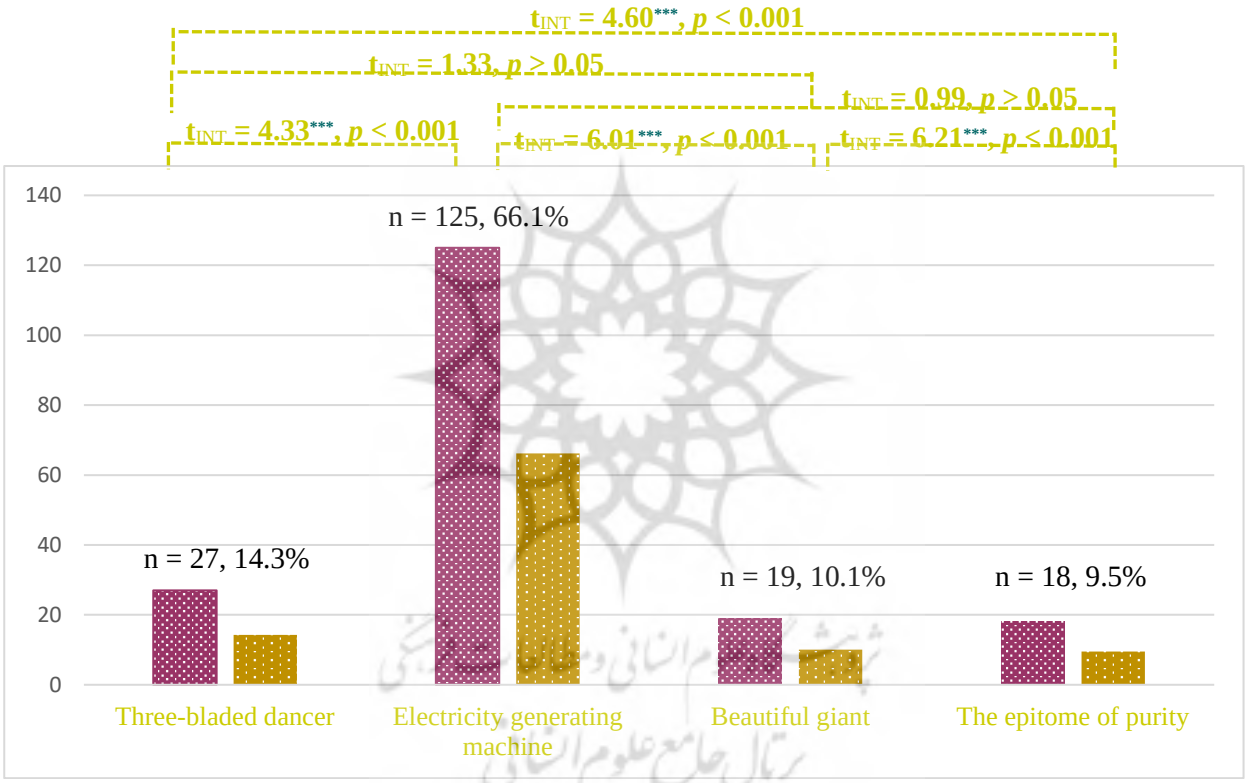


Fig. 1. Bar chart illustrating viable options for wind turbines.

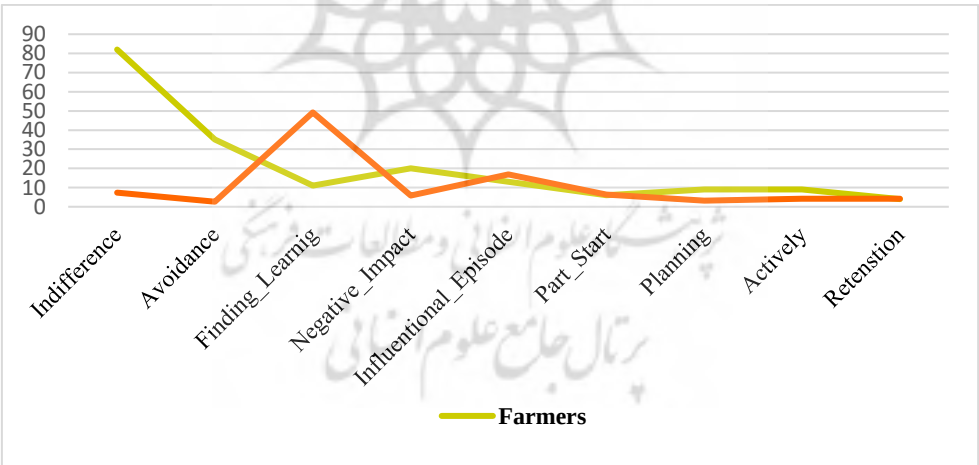
Meanings created by farmers around wind turbines. Connotation analysis is typically used to identify the meanings and interpretations constructed by individuals (the function of ontology). Connotation refers to the implied meaning of words, subjects, and phenomena, while denotation pertains to their literal or original meaning.

According to the stages of change model, participants were questioned about their opinions on air pollution in the area resulting from the use of fossil fuels (such as gas, diesel, fuel oil, etc.) by power plants. They were also asked about the importance of focusing on the development of wind energy. Participants were then asked to select the option from the stages of the transtheoretical model that most closely matched their perspective. The most common response to the initial survey (historically, I had been indifferent and uninterested in contributing to the advancement of wind turbine energy) occurred 82 times, accounting for 43.4% of all responses. Following the process, "I mostly prefer to think about participating in the development of wind turbine energy," while avoiding and evading (not thinking about it) because it is nothing but trouble, was the next most common response (n=35, 15.5%) (See Table 4 and Figure 2).

Table 4. The Processes of Trans-Theoretical Model

	Processes	Research Participants [a]			
		Farmers (n=189)		Experts (n=131)	
1	From the past until now, I have felt indifferent and uninterested in participating in the development of wind energy.	82	43.4	14	7.4
2	I tend to avoid considering involvement in wind energy development because it often leads to complications.	35	18.5	5	2.6
3	I am actively seeking and acquiring new facts, ideas, and information to transform my role and passive behavior in the advancement of wind energy.	11	5.8	93	49.2
4	I acknowledge the negative impact of my non-participation and that of the people in the village and city in the development of wind energy.	20	10.6	11	5.8
5	I confirm that the lack of participation in wind energy development projects is a phenomenon that affects the deterioration of the agricultural situation, jeopardizes my livelihood, and increases air pollution.	13	6.9	32	16.9
6	Seriously, I intend to start participating in plans and projects for electricity generation through wind energy.	6	3.2	12	6.3
7	I am currently actively planning to engage in wind energy development activities, such as preparing to participate in a wind energy development project or planning to join a wind energy.	9	4.8	6	3.2
8	I am now actively involved in the wind energy development project.	9	4.8	8	4.2
9	In the future, I am committed to actively engaging in and contributing to wind energy development projects.	4	2.1	8	4.2

Note: In the field of behavior patterns related to behavior change, the meta-theoretical pattern comprises nine processes or stages of the Trans-theoretical model. Operationally, various interventions are considered for each unique process. Famous theories in the field of behavior, such as the Theory of Planned Behavior (TPB), Causal Action Theory, and Social Cognitive Theory (SCT), are primarily utilized to predict the variance of behavioral intention and actual behavior.



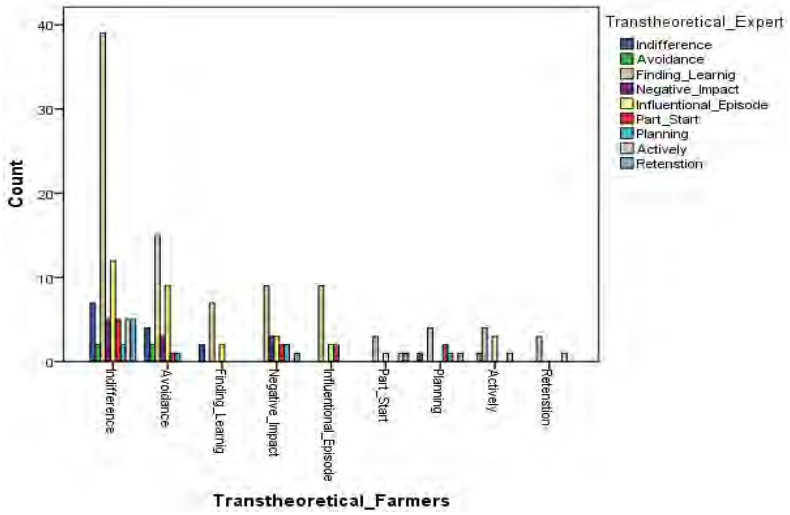


Fig. 2. The bar chart illustrates the stages and processes of the trans-theoretical model.

We can understand the mental and practical stages of the farmers. Management obligations can be implemented in alignment with any process. Considering that the highest frequency is related to the first process in the meta-theoretical model, increasing awareness about the causes, consequences, and solutions related to the development of wind energy through media movements, providing feedback for events, and presenting interpretations can be utilized.

Table 5 presents the t-Student test for paired groups with a normal distribution and the Mann-Whitney U test for paired groups with a non-normal distribution to compare independent variables concerning distances of less than 30 km (n1 = 137) and more than 30 km (n2 = 52) from the wind turbine location. Additionally, it includes the Pearson correlation of independent variables with the distance to the fossil fuel electricity plant. Farmers whose farms are located less than 30 km from a wind energy farm have a higher perception of externality (t(187) = 4.03, p < 0.001), development potentiality (Mann-Whitney U = 2865, p < 0.05), and attitude towards the EDC (Mann-Whitney U = 2841.50, p < 0.05).

Table 5-The results of t-Student test, Mann-Whitney U tests, and Pearson correlation, relationship of independent variables with the distance to area of installed wind turbine and the distance to the fossil fuel electricity plant.

	Two-Sample Kolmogorov-Smirnov Z Test	Distance to the location of the installed wind turbines		t-student test/Mann-Whitney U	Distance to fossil fuel electricity plant
		x_i < 30 km (n1 = 137)	x_i > 30 km (n2 = 52)		
1. Externality	1.86**	4.03	3.57	(t(187)=4.03***	– 0.41**
2. Perceived Sensitivity	1.01	98.66	85.35	3060	– 0.13
3. Perceived Severity	0.93	98.78	85.03	3043.50	– 0.15*
4. Development Potentiality	1.257	100.09	81.60	2865*(a)	– 0.15*
5. Functional Suitability	0.80	96.69	90.55	3330.50	– 0.15*
6. Response to Urgency	0.82	98.68	85.32	3058.50	– 0.20**
7. Attitudes towards participation	0.87	97.51	88.39	3218.50	– 0.08
8. Attitude towards the EDC	1.13	100.26	81.14	2841.50*(a)	– 0.14
9. Supportive Initiatives	0.69	97.48	88.46	3222	0.13
10. Willingness to participate in the development of wind energy	0.86	99.05	84.34	3007.50	– 0.23**
11. Intention	3.54***	4.05	3.44	(t(187)=7.36***(a)	– 0.50**

Note: The distribution of two variables, externality and intention, was normal. Therefore, we used a t-test to compare the means of the respective variables. The reminders were not normally distributed. Therefore, we utilized the Mann-Whitney U test to compare the mean ranks of two groups of regions based on the distance to the area of installed wind turbines,

specifically those within 30 km and those beyond 30 km. Because it is a ratio scale. EDC stands for Electricity Distribution Company. (a) Results obtained from the Mann-Whitney U test.

5. Discussion and Conclusion

The utilization of wind energy in the agricultural sector is a key priority in the policies of the Ministry of Energy and the Ministry of Agricultural Jihad. The present research aims to identify the factors influencing the acceptance of managers and experts in the electricity distribution company regarding the development of wind energy. In this section, the results of quantitative data analysis have been reported first. The results of the correlation analysis between the variables, studied in two parts, focus on the perception of farmers and the perception of authorities and subordinate personnel from the electricity distribution company in the development of wind energy in rural areas.

Externalities directly and significantly affect perceived sensitivity. In addition, side effects have a significant positive effect on the severity perceived by farmers, with a path coefficient of 0.41. The source of side effects in the region is related to the fossil fuel power plant that generates electricity. As mentioned earlier, an externality refers to a phenomenon where, in addition to the two parties directly involved in an economic transaction, there is a third party that is also affected by the transaction. This effect can be positive or negative for the third party. The shape can be either positive or negative. These findings demonstrate the impact of a phenomenon that exists independently of the wind energy production, supply, and demand system. This phenomenon is physically distinct from the reality of wind turbines in the region, despite being separate from the phenomenon of wind turbines. But they are real and are considered a key element in the analysis of the wind energy system. On one hand, there is the reality of consuming fossil fuels, and on the other hand, there is the production of renewable energy sources like wind. In most wind energy research, analysis and interpretation have focused solely on causal factors related to wind energy. However, this study demonstrates that factors external to wind energy production and supply systems also influence acceptance, social responsibility, and the development of wind energy. Therefore, the study suggests that wind energy development should be examined considering the technical, social, and economic characteristics of the field. The phenomenon indirectly related to the development of wind energy is the fossil power plant that generates external effects in the form of air pollution, impacting agricultural products, human health, ecosystem health, and economic justice. Economic justice refers to the mutual benefit between the two parties involved in economic transactions, such as electricity producers and consumers of fossil electricity. However, it often overlooks the externalities on other segments of society and fails to account for external costs.

Air pollution is perceived through sensory signs and imagination, shaped by lived experiences and place identity. The lack of concern about air pollution can largely be explained by the feeling of lack of control and the crowding effect in the competition for attention. This deficiency is primarily influenced by the perceived advantages of residing in major cities, the perceived fairness of the impact on the population, and the perceived delay in health effects from air pollution (Xu et al., 2017). Shahid Rajaei power plant requires 3 billion cubic meters of natural gas annually, but this demand is not fully met, leading to the use of liquid fuel as a substitute. In 2017, the gas company coordinated to receive the largest gas supply quota of the year. A total of 2.7 billion cubic meters of natural gas were delivered and consumed. In the country's power plants, they require 220 to 240 million cubic meters of gas daily, which is highly constrained during winter for large industries. In small power plants ranging from 100 megawatts to large power plants of 2,000 megawatts, like the Shahid Rajaei power plant, alternative liquid fuel must be burned instead of natural gas. This requirement is mandated by the country's authorities to ensure that the supply of gas to household customers remains unaffected. Currently, gas fuel consumption in this power plant has reached zero, and 8,500,000 liters of liquid fuel are consumed daily. Out of this amount, 3 million liters are transported to the power plant by tankers and the rail network (Borna News, 1400). This finding contradicts some evidence. For example, a study of three provinces in Atlantic Canada, including New Brunswick, Nova Scotia, and Prince Edward Island, aimed to determine the

factors affecting the likelihood of paying a non-zero premium for electricity generated using wind technology. Households are willing to pay 14% more monthly on their energy bills for wind power. There is evidence of domain sensitivity (Koto and Yiridoe, 2019).

The attitude towards the electricity distribution company also has a direct and significant effect on the willingness to participate in the development of wind energy. According to this finding, the more positive the attitude, the greater the willingness of farmers to develop wind energy. The excellence in this matter can depend on the extent to which the company's propaganda and information align with the renewable energy development policy. In this case, if the farmers perceive and comprehend that the intellectual and operational policy of the Electricity Distribution Organization focuses on the development and expansion of wind energy, they are likely to desire to contribute to the development of this energy and potentially participate in the projects introduced to their region. Of course, this task of defining projects and contacting farmers will involve assigning responsibility to farmers.

The two variables of functional suitability and response to urgency in wind energy have a positive and significant effect on the willingness to participate in wind energy development projects. The findings show that the perception of the functional nature of wind energy and its other characteristics, such as urgency, will influence farmers' willingness to participate in the development of wind energy. This finding demonstrates that wind energy is compatible with the elements of a sustainable energy production and utilization system.

Participation willingness in development projects has a positive and significant impact on behavioral intention. The philosophical literature highlights additional features that could potentially differentiate between desires and intentions. The first possible criterion is the controllability of the desired behavior. An agent cannot intend to perform a behavior unless that behavior is controllable. However, a distinction must be made between the agent's belief that the behavior is controllable and the actual controllability of that behavior. An agent may decide to start his car, even though he doesn't know that the alternator is not working, making the start uncontrollable. A social perceiver who is aware of the defect attributes the true intention to the agent, even if it is certain that the agent's intention will not be realized. However, if the agent believes that the alternator is malfunctioning and therefore cannot start the car, the perceiver does not assume that the agent intended to start it, but only that he wanted to. Here again, it is not clear exactly how confident the agent must be in the controllability of his behavior before social perception ascribes an intention. However, we can be fairly confident that the perceiver will not attribute intention if the agent is confident that the behavior is uncontrollable (Malle et al., 2001). Intending A requires believing in a will, whereas willing A does not. And the agent can intend to "A" even when he is certain that he will not do A. A certain level of commitment is required before categorizing a mental state as an intention, and the belief that one will not carry out a specific action appears contradictory to committing. It would be confusing for someone to say, "I'm going to go to a party tonight, but I'm sure I won't" because the speaker is clearly showing a lack of commitment. Our measure of commitment indicates that intentional social perceivers do the intention to an agent who simultaneously believes that he will not carry out the intended action. Finally, intending to achieve A requires a plan to perform the behavior of A, or A-ing.

The validity of this claim depends on the details required by such a plan. During the reasoning process, the agent examines the controllability of the action and its compatibility with other demands. The agent initiates the planning process by narrowing down the possible courses of action to a few that are feasible and align with other goals. Reasoning about an intention does not necessarily lead to an action plan. The very act of forming an intention may stimulate the process of developing an action plan (Ibid). Notably, the perceived severity of the negative and significant influence on This finding shows that the greater the perceived risk of air pollution caused by electricity generation from fossil power plants such as diesel in the region, the less behavioral intention will be formed. This issue arises because cognitively and perceptually, the perception of risk severity is appropriately assessed. However, it does not foster the development of an inquisitive and proactive mindset, leading to behavioral intention or actual

behavior. This issue highlights a person's indifference towards air pollution. The person probably thinks that this issue has nothing to do with them, or that they are not in a position to make a change in the pollution situation. Apathy may occur when the problems of life, family, communities, country, and the surrounding world seem so overwhelming that one feels powerless to do anything about them. This means that even when we notice what's going on around us, we may feel like we cannot make a difference. Indifference is a state in which we do not care or take action on what is happening around us. Indifferent people can be seen as cold, aloof, disinterested, unmotivated, and lacking enthusiasm (Buckle, 2024).

6. Conclusions and Management Implications

This article examines the influencing factors on the development of wind energy in the agricultural sector. In this chapter, while reviewing the results and findings obtained in this study, management requirements and suggestions for incorporating social responsibility into the production and supply of wind energy to the market have been discussed. Adverse effects directly and impact affect perceived sensitivity. In addition, this variable has a positive and significant effect on the severity perceived by farmers. The source of side effects is related to the power plant that produces electricity by consuming fossil fuels. It is suggested to the policymakers and practitioners of the Ministry of Environment and the Ministry of Health, Treatment, and Medical Education to enact resolutions aimed at preventing air pollution from polluting sources, particularly power plants that rely on fossil fuels like diesel and liquid gas. This issue is not in its normalized form. In this regard, the development of interdepartmental cooperation and collaboration between relevant ministries plays an important role in facilitating the legislative process and implementing the approvals.

The results of this study indicate that the perceived severity of risk, influenced by the externality of fossil power plants, does not impact the behavioral intention or actual behavior of farmers. The main reason for this finding may be that, from the perspective of the respondents, the externalities of the fossil power plant have such a broad scope and magnitude that exceed farmers' abilities to make changes in air pollution. In this regard, it is suggested to promote a culture of responsibility among farmers and rural people by offering orientation classes. In this regard, citizens should be reminded that phenomena such as the air pollution crisis are formed from the integration of components within the physical-social ecosystem. Therefore, fostering commitment and acceptance of social responsibility among citizens will play a crucial role in crisis management. The attitude towards the electricity distribution company also has a direct and significant effect on the willingness to participate in the development of wind energy. According to this finding, the more positive the attitude, the greater the willingness of farmers to develop wind energy. In this regard, it is suggested that educational programs be designed to build culture and promote encouraging community involvement. These programs should explain to farmers how wind energy works and its compatibility with other elements of society and the physical-social ecosystem. It contributes to the theory and practice of sustainable energy development in Iran and other developing countries (Rezaei and van der Heijden, 2022).

In justifying the finding that perceived intensity has a negative and significant effect on behavioral intention, it was argued that this issue reflects the indifference of the public or government institutions toward air pollution. People think that this issue has nothing to do with me or that I am not in a position to make a change in the pollution situation. It is suggested that training classes be broadcasted through television and radio media. The crisis is pervasive and affects the entire societal system and the physical-social ecosystem. A mixed and continuous perspective should be used in justifying and acculturating these issues.

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Authors contributions

The authors equally contributed to the preparation of this article.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

عوامل مؤثر بر پذیرش توسعه انرژی باد توسط کشاورزان در مناطق روستایی شهرستان قزوین

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چکیده مبسوط

۱. مقدمه

توسعه انرژی باد در مناطق روستایی ایران، یک راه حل امیدوارکننده برای دستیابی به اهداف توسعه پایدار (SDGs) است. هدف مطالعه حاضر، بررسی عوامل مؤثر بر تمایل و قصد کشاورزان برای مشارکت در توسعه انرژی باد در بخش کشاورزی است. تجربه جهانی نشان می‌دهد که پذیرش عمومی یا پذیرش اجتماعی فنآوری‌های انرژی تجدید پذیر، در وضعیت مطلوبی قرار ندارد. به ویژه اینکه احتمال مشارکت مردم روستایی در توسعه این فناوری‌ها، پایین است. در واقع، انتقال به انرژی‌های سبز یک فرآیند تدریجی، پیچیده و کل نگر است که شامل ذینفعان متنوع، ابعاد، جنبه‌ها و ویژگی‌های مختلف است. در ارتباط با نقش این انرژی‌ها در توسعه محیط‌زیستی، اجتماعی و اقتصادی مناطق روستایی، بر بهبود و اصلاحات اجتماعی و محیطی‌زیستی تأکید می‌شود. در این راستا، دولت ایران اهداف ملّی را برای توسعه منابع انرژی‌های تجدید پذیر در بخش کشاورزی تعیین کرده و بر نقش مشوق‌های کاربر نهایی و زیرساخت‌ها برای نشر اطلاعات و آموزش فنّی تأکید نموده است. در این راستا، اگرچه عوامل فنّی بیشتر مورد توجه قرار می‌گیرند، اما جنبه‌های اقتصادی، نهادی، اجتماعی و روانشناختی نیز در گذار به دستیابی به انرژی باد نباید نادیده گرفته شوند. بنابراین، مطالعه حاضر، تأثیر تمایلات کشاورزان و اهداف رفتاری آنها را روی توسعه انرژی باد در بخش کشاورزی بررسی نموده است.

۲. مبانی نظری تحقیق

در تحقیق حاضر، متغیرهای عوارض جانبی، حساسیت ادراک‌شده پیرامون خطر آلودگی هوا ناشی از نیروگاه‌های فسیلی، شدت درک شده از خطر آلودگی هوا، پتانسیل توسعه، تناسب عملکردی، پاسخ به فوریت، تمایل به مشارکت در توسعه انرژی باد، نگرش پیرامون مشارکت در برنامه‌ها و پروژه‌های توسعه انرژی باد، نگرش نسبت به متخصصان شرکت توزیع برق منطقه‌ای و اقدامات حمایتی بررسی شدند. در این راستا، ضمن مرور ادبیات تحقیق پیرامون متغیرهای فوق، با استفاده از روش شهود، به تدوین گزاره‌های مفروض پرداخته شد.

۳. روش تحقیق

نمونه تحقیق شامل ۱۸۹ کشاورز و افراد روستایی بود که از طریق نمونه‌گیری تصادفی انتخاب شدند. با توجه به نسبت جمعیت کشاورزان به جمعیت کل روستاهای هر دهستان، اندازه نمونه محاسبه شد و به پیمایش پاسخگویان در این روستاها اقدام شد. با توجه به کنار گذاشتن پرسشنامه‌ها با اطلاعات ناقص، داده‌های ۱۸۹ پرسشنامه با اطلاعات کامل تحلیل شد. اعتبار درونی شاخص‌های پرسشنامه نیز با بررسی ضریب آلفای کرونباخ و نمرات بارگذاری از طریق تحلیل مؤلفه‌های اصلی (PCA) ارزیابی شد که در محدوده قابل قبولی قرار داشتند. همچنین، برای تحلیل داده‌ها در نرم‌افزار SPSS24، از الگوی آماری تحلیل مسیر استفاده شد.

۴. یافته‌های تحقیق

نتایج مطالعه نشان داد که عوارض جانبی (Externality) به طور مستقیم و قابل توجهی بر حساسیت درک شده تأثیر می‌گذارند. علاوه بر این، متغیر عوارض جانبی با ضریب مسیر ۰/۴۱ تأثیر مثبت و معناداری بر شدت درک شده دارد. نگرش مطلوب پیرامون شرکت توزیع برق نیز تأثیر مستقیم و معناداری بر تمایل به مشارکت در توسعه

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انرژی باد دارد. منطق عملکردی و منطق فوریت به طور مثبت و معناداری بر تمایل به مشارکت در پروژه‌های توسعه انرژی باد تأثیر می‌گذارند. متغیر تمایل به مشارکت در طرح‌های توسعه تأثیر مثبت و معناداری بر قصد رفتاری دارد. مجذور همبستگی چندگانه برای متغیرهای حساسیت، شدت درک شده، تمایل به مشارکت در پروژه‌های توسعه انرژی باد و قصد رفتاری برای مشارکت به ترتیب ۰/۱۶، ۰/۱۷، ۰/۳۳ و ۰/۲۲ گزارش شده است. به طور کلی، نتایج نشان داد که تمایل کشاورزان روی ترویج و توسعه انرژی باد تأثیر می‌گذارد. بعلاوه، با استفاده از مدل فرانظری، مشخص شد که اکثریت کشاورزان در مراحل «افزایش آگاهی» و «تسکین چشمگیر» قرار دارند، در حالیکه کارشناسان در مراحل «خودارزیابی مجدد» و «خودرهایی» هستند.

۵- بحث و نتیجه گیری

نتایج نشان داد که عوارض جانبی به طور مستقیم و معناداری بر متغیر حساسیت درک شده تأثیر می‌گذارد. همچنین، این متغیر تأثیر مثبت و معناداری بر شدت درک شده توسط کشاورزان دارد. منبع عوارض جانبی مربوط به نیروگاه با مصرف سوخت‌های فسیلی است. پیشنهاد می‌شود که با همکاری بین سیاستگذاران وزارت انرژی، محیط‌زیست و وزارت بهداشت به تصویب قطعنامه‌هایی با هدف جلوگیری از آلودگی هوا از منابع آلاینده، به ویژه نیروگاه های با سوخت فسیلی اقدام شود. در همین راستا، توسعه همکاری‌های بین بخشی و همکاری بین وزارتخانه‌ها مربوطه نقش کلیدی در تسهیل روند قانونگذاری و اجرای مصوبات دارد. بعلاوه، نتایج این مطالعه نشان داد که شدت درک شده خطر، تحت تأثیر عوارض جانبی نیروگاه های فسیلی، روی قصد رفتاری یا رفتار واقعی کشاورزان تأثیر نمی‌گذارد. دلیل اصلی این یافته این است که از دیدگاه پاسخگویان، دامنه و بزرگی عوارض جانبی نیروگاه‌های فسیلی بقدری است که از توانایی کشاورزان برای ایجاد تغییر در میزان آلودگی هوا بیرون است. در این راستا، باید به شهروندان یادآوری کرد که پدیده هایی مانند بحران آلودگی هوا از ادغام اجزای موجود در اکوسیستم فیزیکی-اجتماعی تشکیل می‌شود. بنابراین، تقویت تعهد و پذیرش مسئولیت اجتماعی در بین شهروندان نقش مهمی در مدیریت بحران خواهد داشت. همچنین، نگرش به شرکت توزیع برق نیز تأثیر مستقیمی و قابل توجهی در تمایل به شرکت در توسعه انرژی باد دارد. با توجه به این یافته، هرچه نگرش مثبت‌تر باشد، تمایل کشاورزان برای توسعه انرژی باد بیشتر می‌شود. در این راستا، پیشنهاد می‌شود که برنامه‌های آموزشی برای ایجاد فرهنگ مشارکت در توسعه انرژی باد طراحی شود.

کلیدواژه‌ها: تجدیدپذیر، انرژی، توسعه، پذیرش، توربین باد. قزوین.

تشکر و قدرانی

این مطالعه به همکاری‌های علمی و پژوهشی بین کشور ایران و کشور ترکیه (فراخوان شمس تبریزی) مربوط می‌شود و از طرف مرکز مطالعات و همکاری‌های بین المللی وزارت علوم، تحقیقات و فناوری مورد حمایت مالی قرار گرفته است. قرارداد پژوهشی مربوطه به شماره ۲۶۱۳ می‌باشد. نویسندگان از ریاست و کارکنان این مرکز، کمال تشکر و سپاسگزاری بعمل می‌آورند.

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