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Foresight of the Cooperative Sector in Ardabil Province by 2031 and presentation of regional development strategies

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Abstract

Background and Objective: Rapid technological developments (such as artificial intelligence, automation, and the digital economy), labor market fluctuations, demographic changes, and increasing societal expectations in the field of welfare require a review of new missions and mechanisms. This study aimed to conduct foresight analysis of the cooperative sector in Ardabil Province by 2031 and propose development strategies.

Methodology: The research was descriptive-inferential and foresight-oriented, employing a mixed quantitative and qualitative approach. The statistical population consisted of 58 experts, government and non-government officials, cooperative members, and researchers in the cooperative sector, selected through purposive and snowball sampling. Data were collected via Likert-scale questionnaires, semi-structured interviews, and documentary studies. Various methods were used for data analysis: PESTEL analysis to identify macro-environmental factors, MICMAC method to examine interrelationships among key variables, and Shell scenario planning to develop future scenarios. Additionally, correlation analysis, Kruskal-Wallis test, SWOT analysis, TF-IDF technique, and K-Means clustering were applied for quantitative and qualitative data analysis.

Results and Findings: The results indicated that economic factors, such as inflation rates, and political factors, such as political stability, were the most influential. Technology was identified as a key driver, and scenarios of economic stagnation and water scarcity threats were deemed the most likely futures. The absence of significant differences among respondent groups facilitated unified policymaking. Ultimately, strategies such as leveraging strengths to capitalize on opportunities, focusing on key factors, preparing for likely scenarios, and promoting technological development were proposed. These findings can assist policymakers and cooperative managers in formulating sustainable development strategies. While numerous studies on foresight and related topics have been conducted domestically and internationally, no research has been observed specifically on the foresight of the cooperative sector in Ardabil Province.

Keywords: Foresight, Cooperative Sector, PESTEL Analysis, Scenario Planning, Ardabil.

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Extended Abstract

Introduction:

The cooperative sector plays a pivotal role in fostering economic resilience, social equity, and sustainable development, particularly in regions like Ardabil Province, Iran, which grapples with unique challenges such as high youth unemployment, rural migration, and vulnerability to climate change. Ardabil, located in northwestern Iran, boasts rich historical, natural, and strategic assets, including renewable energy potential and tourism opportunities. However, according to the Statistical Center of Iran (2023), the province's unemployment rate exceeds the national average by 2-3%, with declining shares of agriculture and industry in employment. This exacerbates brain drain among educated youth and hampers innovation, as highlighted in the Ardabil Governorate's Social Studies Office report (2021). National frameworks, such as Iran's Seventh Development Plan (2024-2028) emphasizing national resilience and social justice, and the 20-Year Vision Document (targeting 7% unemployment reduction by 2025), underscore the need for balanced regional growth. Yet, the Court of Audit's report (2022) reveals Ardabil's underperformance in attracting investments and research infrastructure, despite potentials in green energy and ecotourism. Global disruptions further complicate the landscape. The Fourth Industrial Revolution, driven by artificial intelligence (AI), automation, and the digital economy, threatens to displace up to 25% of Ardabil's traditional jobs by 2031, per the Majlis Research Center (2023). The gig economy's rise, coupled with inadequate legal protections for platform workers, heightens vulnerabilities for the province's youth, as noted by the Ministry of Cooperatives, Labor, and Social Welfare (2021). Policy gaps, including the absence of integrated labor market monitoring systems (Vocational Training Organization, 2023), widen the chasm between Ardabil's intrinsic capacities and adaptive frameworks. This misalignment manifests in tensions between rapid job creation via short-term projects and long-term investments in knowledge-based sectors; traditional cooperative models focused on agriculture and small industries versus digital reconfiguration; and national social security policies versus localized needs of nomadic and border communities comprising 30% of the population (Nomads Affairs Organization, 2021).

The 2025 United Nations declaration of the International Year of Cooperatives amplifies Iran's commitment, with over 3 million cooperatives engaging 10% of the global workforce. However, rapid technological shifts, labor fluctuations, demographic changes, and rising welfare expectations necessitate mission redefinition (Farhang, 2022; Ernst et al., 2019; Souzha, 2025). This study conducts foresight analysis of Ardabil's cooperative sector by 2031, employing PESTEL analysis and Shell scenario planning to identify key drivers, uncertainties, and strategies for sustainable development. The primary objective is to bridge the gap between current realities and desirable futures aligned with upstream documents. Hypotheses include: (1) PESTEL and scenario planning can predict cooperative futures and propose development strategies; (2) key uncertainties significantly shape future scenarios. Theoretical foundations draw from strategic foresight (Wack; Schwab; Matters, 2019; Iden et al., 2017; Nascimento et al., 2021), social resilience (Folke; Walker; Saja et al., 2021; Folke et al., 2010), modern cooperative economics (Ostrom, 1990; Sobolev et al., 2020), social justice (Sen, 1999; Nussbaum; Capeheart & Milovanovic, 2020), and innovation ecosystems (Christensen, 1997; Arenal et al., 2020). Literature review reveals extensive domestic and international foresight

studies, but none specific to Ardabil's cooperatives, addressing gaps in regional applications amid environmental and migration challenges.

Methodology

This descriptive-inferential foresight study adopted a mixed-methods approach, integrating quantitative and qualitative techniques for robustness. The population comprised 58 experts, government/non-government officials, cooperative members, and researchers in Ardabil's cooperative domain, selected via purposive and snowball sampling until theoretical saturation. Participants included 14 government officials, 11 cooperative members, 12 foresight specialists, 2 researchers, and 14 academics (response rate: 91.7%). Data collection involved Likert-scale questionnaires (30 items, 5-point scale), semi-structured interviews with 15 experts, and documentary analysis.Instrument validity was ensured through content and face validity by five experts, with revisions for clarity and sequence. Reliability was confirmed via Cronbach's alpha (>0.7 overall; e.g., political factors: 0.687; economic: 0.646; social: 0.761; key variables: 0.811; scenarios: 0.788; total: 0.896), indicating tool consistency. Independent variables encompassed government policies, inflation, public trust, technology, water scarcity, and legal factors; mediators included economic, technological, and political uncertainties; dependents were scenarios like sustainable growth, stagnation, stability, water threats, and tourism hub transformation.

Analysis employed diverse methods: PESTEL for macro-environmental prioritization (Yusop, 2018; Buye, 2021); MICMAC for cross-impact matrices of key variables (sanctions, technology, growth, recession, education, infrastructure) with a 0.3 threshold (Mohanty, 2018); Shell scenario planning for futures based on uncertainties (Johnson et al., 2020; Schwartz, 1991; Haeberle et al., 2024). Quantitative tools included Pearson correlation and heatmaps (Seaborn, Python; Sial et al., 2021), Kruskal-Wallis tests for group differences (Jamil & Khanam, 2024), TF-IDF for open-ended responses, and K-Means clustering (Scikit-learn). SWOT analysis used score thresholds (>3.5 for strengths/opportunities; <2.5 for weaknesses/threats). Trend analysis via line charts (Matplotlib; Johnson et al., 2020) examined group patterns. Ethical protocols, including informed consent and data confidentiality, were upheld. Python libraries (Seaborn, Scikit-learn, SciPy) processed data, ensuring reproducibility.

Results and Discussion

Demographics revealed a diverse sample: 36.2% aged 41-50, 39.7% master's holders, and balanced activity domains. Open-ended responses highlighted uncertainties (currency/inflation: 55%; tech/digital: 45%; climate/water: 35%) and scenarios (sustainable growth: 40%; recession: 35%; digital transformation: 25%), with strategies emphasizing government support (60%), training (50%), tech adoption (45%), and bureaucracy reduction (40%). PESTEL results prioritized inflation/economic volatility (mean: 4.644, weight: 0.0632) and political stability (4.475, 0.0609), followed by financial access (4.393) and water scarcity (4.034), visualized in bar charts. Dependency on traditional products scored lowest (3.31), signaling diversification needs. MICMAC scatterplots positioned technology as a key driver (high impact/dependency in Quadrant I), infrastructure as independent (Quadrant III), aligning with qualitative emphases on tech for cooperative renewal (Arcade et al., 2015). Open-response clustering (K-Means) yielded three groups: economic improvements, political/bureaucratic changes, and vague entries, underscoring economic-political dominance. Scenario likelihoods (bar chart) deemed recession (4.190) and water threats (4.034) most probable, followed by tourism hub (3.877) and

sustainable growth (3.776); stability scored lowest (3.561). TF-IDF extracted keywords like "recession" and "sustainable growth." SWOT identified strengths in political/economic/social/tech factors (all >3.5 means) and opportunities across all scenarios (>3.5), with no weaknesses/threats, possibly reflecting optimism or thresholds (Hill & Westbrook, 1997). Correlation heatmap showed strong positive links between stability and inflation ($r>0.7$), negative between growth/recession, reinforcing MICMAC's tech centrality (Field, 2013). Kruskal-Wallis tests ($p>0.05$ across PESTEL items, e.g., inflation: 0.4298; water: 0.0737) indicated no significant group differences, enabling unified policymaking. Trend lines confirmed consensus on inflation/stability but officials' caution on policies. Hypotheses were supported: PESTEL/scenarios predicted futures and strategies; uncertainties (e.g., inflation/tech) shaped outcomes. Discussions integrate findings with literature: economic/political drivers echo Niazi et al. (2024) on sanctions/finance; tech as driver aligns with ILO (2021) on retraining; water threats resonate with IPCC (2021) regional risks. Ardabil's context amplifies migration/climate gaps, positioning cooperatives as resilience hubs via digital/agri-tech integration.

Conclusion

This foresight study illuminates Ardabil's cooperative trajectory by 2031, confirming inflation, stability, and technology as pivotal influencers, with recession and water scarcity as likeliest scenarios amid opportunities in digital transformation and tourism. Both hypotheses validated the efficacy of PESTEL/MICMAC/Shell methods for prediction and strategy formulation. Key achievements include unified stakeholder views for integrated policies, tech's catalytic role, and SWOT-derived leverages for resilience. Recommendations: Diversify revenues via sustainable tourism/knowledge industries to counter inflation; deploy smart irrigation/recycling for water risks; implement digital platforms/AI training for productivity; establish advisory councils for growth/tourism scenarios. These strategies, grounded in local-global insights, empower policymakers for equitable, adaptive cooperatives, advancing UN SDGs and Iran's visions. Future research could model post-2031 dynamics or comparative provincial analyses.

Declarations

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Authors' Contribution

The article is a single-authored article.

Conflict of Interest

The author declares no conflict of interest.

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