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Qualitative Analysis and Prioritize the Challenges of Sustainable Agricultural Development through Grounded Theory and AHP in Iran

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Abstract

The purpose of this research is to conduct a qualitative analysis and prioritize the challenges of sustainable agricultural development in Iran. Using a qualitative method, this study seeks to identify the challenges of sustainable agricultural development in Khuzestan province. Qualitative research involves in-depth evaluation, collection, and analysis of non-numerical data to understand phenomena, concepts, ideas, or experiences. This research was conducted from January to September 2021 to develop a comprehensive and practical model for understanding these challenges through grounded theory and the Analytic Hierarchy Process (AHP) in Khuzestan province. It is an applied study utilizing systematic grounded theory. Data were collected through in-depth, semi-structured interviews with 30 agricultural experts. Data analysis was performed using MAXQDA 12 software in three stages: open coding, axial coding, and selective coding. The grounded theory approach identified 29 initial codes, which were categorized into six main challenges, prioritized using AHP: Weakness in management and planning, weakness in human resources, lack of attention to environmental studies, shortage of infrastructure facilities, shortage of credit and financial capital and weakness in legislation and sustainability policy. Finally, a model was developed based on the study's findings.

Keywords:
Sustainable agricultural development, grounded theory, analytic hierarchy process, Iran

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INTRODUCTION

In recent years, sustainability has been one of the most important strategies and concerns in policymaking and the development of national and regional programs, particularly in the agricultural sector (Asimeh et al., 2020). Growth-oriented agricultural policymaking, along with the failure of these policies and market inefficiencies, has led to social, economic, and environmental unsustainability in this sector, emphasizing the need for sustainable agricultural development (Moridsadat and Roknoddin Eftekhari, 2018).

Agriculture plays both positive and negative roles in economic sustainability (Skrimizea et al., 2020). It provides food for the world's growing population and supplies raw materials for industry (Abro and Awan, 2020). Additionally, agriculture serves as a key source of income and employment, particularly in rural communities, and contributes significantly to the economies of developing countries (Kalantaryan et al., 2021).

However, agricultural activities can also have detrimental environmental effects, including the depletion of water and soil resources, air pollution, and reduced ecological diversity (Rani et al., 2021). The widespread use of nitrogen fertilizers, especially in developed countries, further exacerbates environmental concerns, with China being the largest producer and consumer of these fertilizers (Hartmann et al., 2020).

Global fertilizer use (N + P2O5 + K2O) was estimated at 198.2 Mt of nutrients in Fertilizer Year 2020/21, almost 10 Mt (5.2%) higher than in 2019/20. This is the largest increase since 2010/11 (IFA, 2021). Nitrogen, which accounts for over half of global fertilizer use, saw a 4.1 percent (4.3 Mt) increase in demand, reaching 110.0 Mt in 2020/21. Demand for phosphorus rose by 7.0 percent (3.3 Mt) to 49.6 Mt, while demand for potash increased by 6.2 percent (2.2 Mt) to 38.5 Mt (IFA, 2021). The latest OECD-FAO agricultural outlook, released in July 2021, projects that annual global fertilizer demand will grow by approximately 1percent between 2021 and 2025, with a slight decline over the last three years of the period. Growth rates are expected to be slightly higher for K_2O than for P_2O_5 and N. These projections indicate an increase of 8 Mt in nutrient demand between 2021/22 and 2025/26, with global fertilizer use expected to reach 208 Mt by 2025/26 (IFA, 2021).

According to the FAO (2020), more than 698,000 tons of chemical fertilizers were used in Iran in 2018. That year, nitrogen fertilizer consumption reached 565,000 tons, while P_2O_5 fertilizer consumption increased by 100,000 tons. Khuzestan, Fars, Golestan, and Khorasan Razavi had the highest fertilizer supply in the country. Currently, the average annual pesticide consumption in Iran ranges from 25,000 to 30,000 tons (AgNews, 2020). The agricultural sector in Khuzestan province faces several sustainability challenges (Kaabi et al., 2021), including the illiteracy or primary-level education of more than half of its workforce, a high unemployment rate, and declining employment in the sector. As a result, the province struggles with various economic and social issues and has become one of the most critical regions in the country in terms of environmental hazards (Moridsadat and Roknoddin Eftekhari, 2018).

The current state of agriculture in Khuzestan province is unsustainable. High levels of unsustainability are evident in water pollution (Ommani, 2019), soil erosion (Amanpour et al., 2021), excessive use of external inputs such as fertilizers and chemical pesticides (Moridsadat and Roknoddin Eftekhari, 2018), the failure to adopt a suitable cultivation pattern (Abdeshahi et al., 2020), and low production efficiency (Hesampour et al., 2021). Given these challenges and the unsustainable agricultural conditions, identifying the obstacles to sustainable agricultural development in Khuzestan province is crucial for improving food security. Addressing these challenges and working to mitigate them will help create the necessary conditions for sustainable agricultural development.

Wang et al. (2021), in their study identified the key challenges of sustainable agricultural development in the Mosuowan irrigation area of Xinjiang as follows: (1) soil salinization, (2) ecological and environmental deterioration, (3) declines in economic benefits, and (4) soil and environmental pollution. To address these challenges, they proposed the following measures: (1) comprehensive management of saline-alkali land through soil improvers, biological methods, and drainage infrastructure; (2) the establishment of desert-oasis ecological buffer zones; (3) adjustments to agricultural management policies; and (4) improvements in plastic recycling or degradability, along with modifications to irrigation and fertilization strategies to reduce soil pollution. Zhang et al. (2021) emphasized that a major challenge in achieving sustainable agriculture is the need to "acknowledge and explore the full range of potential trade-offs and, in some cases, contradictions between sustainability and productivity."

Maleksaeidi et al. (2021) identified nine key categories of challenges threatening agricultural sustainability: (1) shortage of investment and liquidity, (2) environmental and climate disasters, (3) scientific weaknesses, (4) weaknesses in the agricultural labor force, (5) management problems, (6) weaknesses in information systems, (7) low agricultural productivity and lack of focus on quality, (8) challenges related to agricultural inputs, and (9) global challenges. This nine-factor structure, confirmed through confirmatory factor analysis, explained 67.52 percent of the variance related to sustainability challenges in western Iran. Ataei et al. (2021) classified the challenges of implementing conservation agriculture (CA) into six general categories: (1) institutional-infrastructure (7 concepts), (2) economic (5 concepts), (3) training-research (2 concepts), (4) environmental (4 concepts), (5) mechanization (2 concepts), and (6) cognitive (2 concepts). Economic and institutional-infrastructure challenges were the most significant barriers to adopting CA. To effectively address these challenges, it is essential to establish strong linkages between government sectors (such as the Ministry of Agriculture), education and research institutions (e.g., Agricultural Research, Education, and Extension Organization), and industry. The main objective of this research is to conduct a qualitative analysis and prioritize the challenges of sustainable agricultural development in Iran. Table 1 presents the theoretical framework of this study.

METHODOLOGY

In this research, a qualitative method was used to identify the challenges of sustainable agricultural development in Khuzestan province. Qualitative research involves the in-depth evaluation, collection, and analysis of non-numerical data to identify and understand phenomena, concepts, ideas, or experiences. It helps generate deep insights into a problem or challenge and can inspire new research directions.

This study was conducted from January to September 2021 to develop a comprehensive and practical model for understanding sustainable agricultural development challenges using grounded theory and the Analytic Hierarchy Process (AHP). Grounded theory is a qualitative research method in which data is

Table 1
Theoretical Framework of Research.

Challenges of sustainable agricultural development	Researches
Social and economic	Ataei et al. (2021); Maleksaeidi et al. (2021); Wang et al. (2021)
Production and environment	Wang et al. (2021); FAO (2020)
Legislation and management	Maleksaeidi et al. (2021); Wang et al. (2021)

collected primarily through various types of interviews. By analyzing and coding the interview transcripts, a paradigm model is developed (Vogel et al., 2021). In the grounded theory approach, a theory is constructed from data to explain a process, action, or interaction on a larger scale (Yu and Smith, 2021).

Most researchers follow the Strauss and Corbin method for conducting grounded theory analysis. The theory emerging from this approach is a process theory. One of the key advantages of grounded theory, as noted by Charmaz and Thornberg (2021), is that it is systematically developed based on real data. It is particularly suitable for situations where existing knowledge is limited, and no established theory exists to formulate a testable hypothesis. Grounded theory evolves throughout the research process, emerging through continuous interaction between data collection and analysis.

In this study, the purposive sampling method and theoretical sampling strategy were used. The statistical sample consisted of 30 agricultural experts from Khuzestan province, selected using the snowball sampling method. In this approach, the researcher identified individuals who could effectively answer the research questions and had relevant knowledge about sustainable agricultural development. Sampling continued until information saturation was reached. The selection criteria included holding at least a bachelor's degree, having a minimum of 10 years of experience in the agricultural sector, and possessing knowledge of sustainable agricultural development indicators. To collect research data, interviews and brainstorming techniques were utilized. Several interviews and five brainstorming sessions were conducted with experts from the Agricultural Jihad of Khuzestan province who were familiar with the subject.

During these sessions, the researcher first met with the participants, explained the objectives and methodology of the research, and requested them to allocate sufficient time for interviews and meetings. A brief explanation of the research topic was provided to ensure clarity. The coding of interviews was conducted in three stages: Open Coding, Axial Coding, and Selective Coding.

Open coding: After conducting the sessions, the researcher identified key concepts, assigned appropriate labels, and grouped related concepts. Open coding involves naming and categorizing phenomena through careful analysis. The data is broken into separate segments and compared for similarities and differences. The first step in coding is to assign titles to identified phenomena.

Axial coding: The next step involved discovering categories by grouping related concepts around specific phenomena. This process reduces the number of distinct units by classifying concepts that relate to similar ideas. A category that contains related codes (tags) is assigned a conceptual name.

Selective coding: This is the main stage of theorizing, where the central category is systematically connected to other categories. Relationships among categories are established within a key phrase, and necessary refinements are made. At this stage, the main concepts are extracted.

The data collection tools for the qualitative part of the research included semi-structured interviews and brainstorming sessions. To ensure validity, the triangulation strategy was employed, meaning the research was conducted from multiple perspectives. To measure reliability, constant testing, data comparison, and tabular recording methods were used.

Once the challenges were identified, they were prioritized using the Analytic Hierarchy Process (AHP). AHP is widely used in group decision-making and is particularly useful for prioritizing alternatives based on specific criteria (Mujumdar et al., 2021). It helps decision-makers determine a solution that aligns with their objectives and understanding of the problem. AHP provides a structured and rational framework for defining the decision-making process, linking elements to overall goals, and evaluating alternative solutions (Fang and Partovi, 2021).

- Steps to Implement AHP:
- Define Alternatives.
- Define the Problem and Criteria.
- Establish Priorities Among Criteria Using Pairwise Comparison.
- Check Consistency.
- Determine Relative Weights.

RESULTS AND DISCUSSION

Individual characteristics

The statistical population of this study consisted of 30 agricultural experts from the Agricultural Jihad. Their average age was 46.51 years, and their average work experience was 17.23 years. Among them, 13 participants (43.33%) held a master's degree, while 17 participants (56.67%) held a bachelor's degree, making it the most common educational level in the sample.

Coding/categorization stage

After conducting in-depth interviews and multiple brainstorming sessions over a period of three months, the challenges of sustainable agricultural development were identified through three stages of coding: open coding, axial coding, and selective coding, using MAXQDA 12 software. First, the semantic units derived from brainstorming and face-to-face interviews were transcribed and refined. These edited transcripts were then entered into the software, where the three coding stages were systematically applied in sequence.

Open coding

At this stage of coding, content analysis was performed through a careful, line-by-line review of the collected data to refine and adjust the identified concepts. First, the interview data were analyzed, and responses were structured into semi-structured questions during the interview process. Key issues were extracted in separate sentences, allowing the identification of 29 concepts from the semi-structured interviews and brainstorming sessions with experts. To ensure consistency, main sentences under the heading of concepts were extracted from direct quotations that had at least five repetitions, and each was assigned a code marked with "Ch." The results of the open coding process are presented in Table 1.

Axial coding

At this stage, the frequency of concept repetitions was determined, and categories were extracted. Based on the results of axial coding, the most significant challenges of sustainable agricultural development in the study area are summarized in Table 2. The analysis identified six main categories, encompassing 29 brief descriptions with a total of 390 repetitions.

In the axial coding stage, the categories derived from open coding were further analyzed based on key factors such as causality, central phenomenon, contextual conditions, strategy, and consequences. Axial coding was structured according to the conceptual model (Figure 1), ensuring that subcategories were systematically linked to the main classifications within the model. The primary goal was to enable the researcher to organize and interpret the data systematically.

Selective coding

At this stage of the research, the relationships identified during open coding and the subcategories derived from axial coding were linked to the main category based on the repetition rate index and visualized in a graph. Figure 1 illustrates that the most critical challenges of sustainable agricultural development in the study area, in order of priority, are: Weakness in management and planning, weakness in human resources, shortage of attention to environmental studies, shortage of infrastructure facilities, shortage of credit and financial capital and weakness in legislation and sustainability policy.

Prioritize Sustainable Agricultural Development Challenges through Hierarchical Analysis (AHP)

After identifying the decision-making alternatives (challenges of sustainable agricultural development) and determining the

Table 2

Concepts Extracted from the Interviews (in open coding).

Concepts (Initial codes)	Code
Shortage of proper market infrastructure for products with a sustainable and organic approach	CH_1
Shortage of proper conversion and packaging industries	CH2
Shortage of necessary educational infrastructure in rural areas	CH3
Shortage of necessary physical and equipment infrastructure	CH4
Shortage of transport and export infrastructure	CH5
Shortage of sufficient credit for agricultural insurance	CH6
High costs of sustainable agricultural production	CH7
Low credits for sustainable agricultural development training programs	CH8
Shortage of development credits and infrastructure in the field of sustainable agriculture	CH9
Shortage of financial resources to provide conservational machinery	CH10
Shortage of adequate financial infrastructure	CH11
Low technical knowledge of sustainability among farmers	CH12
Low technical knowledge of sustainability among experts	CH13
Failure to hold sustainable agricultural management training courses	CH14
Shortage of training needs assessment in the field of sustainability	CH15
Shortage of development of a culture of using sustainable agricultural products	CH16
Shortage of institutionalization of principles, foundations and strategies of sustainable agriculture	CH17
Shortage of transparency of insurance laws	CH18
Shortage of policies to manage price risk in the region's agriculture	CH19
Failure to pay attention to environmental protection laws	CH20
Shortage of proper implementation policies for sustainable agricultural development	CH21
Shortage of proper crop rotation management plans	CH22
Shortage of managerial and executive studies of favorable land management in the region and proper cultivation pattern	CH23
Shortage of planning for conducting sustainability research tailored to the conditions of the region	CH24
Shortage of planning educational and extension programs with sustainable agricultural content	CH25
Implementation of projects without regard to environmental attachments	CH26
Improper use of chemical inputs	CH27
Improper use of agricultural implements	CH28
Land use change and the spread of environmental hazards	CH29

criteria and sub-criteria, qualitative methods such as content analysis, expert interviews, and brainstorming were employed. Initially, 9 indicators and 68 sub-indicators were identified using content analysis. Subsequently, through expert interviews and brainstorming, 5 indicators and 32 sub-indicators, agreed upon by at least 70 percent of the respondents, were selected. To compare the alternatives, a decision tree was designed using Expert Choice software (Figure 2). The challenges were then prioritized based on the criteria and sub-criteria. A pairwise comparison questionnaire was completed by 30 experts to assess the challenges in relation to each sub-criterion. Following the pairwise com-

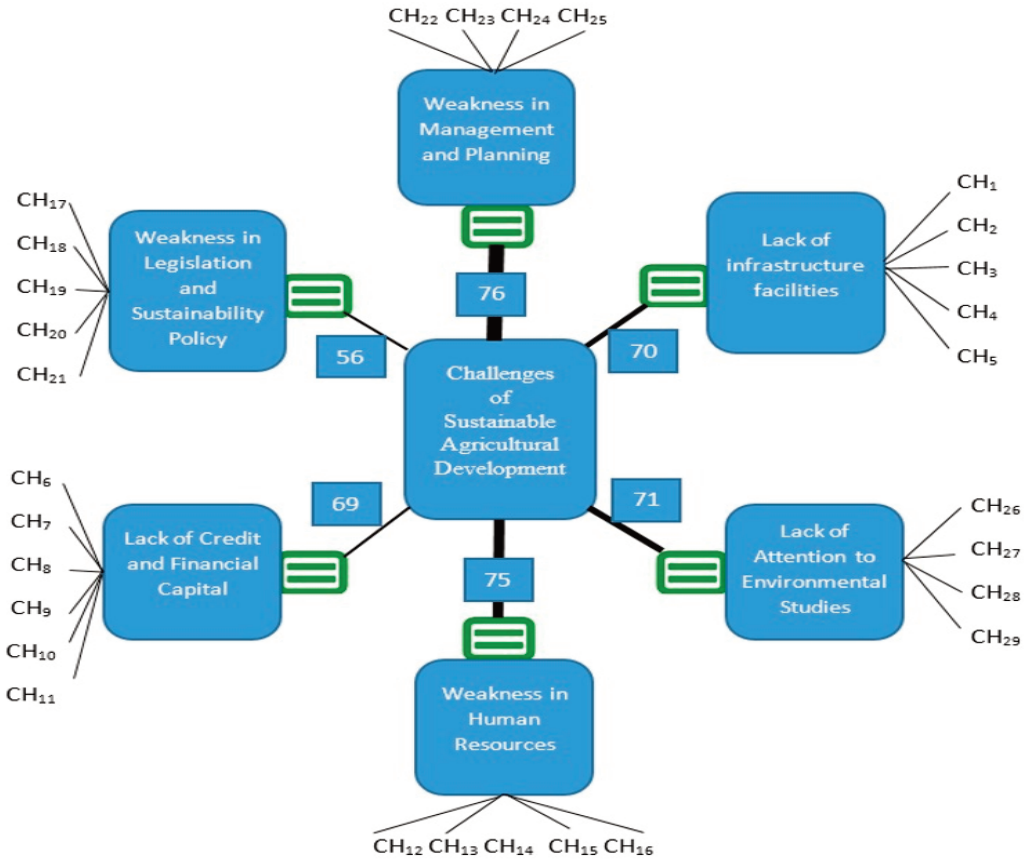

Figure 1. Selective Coding Related to the Challenges of Sustainable Agricultural Development.

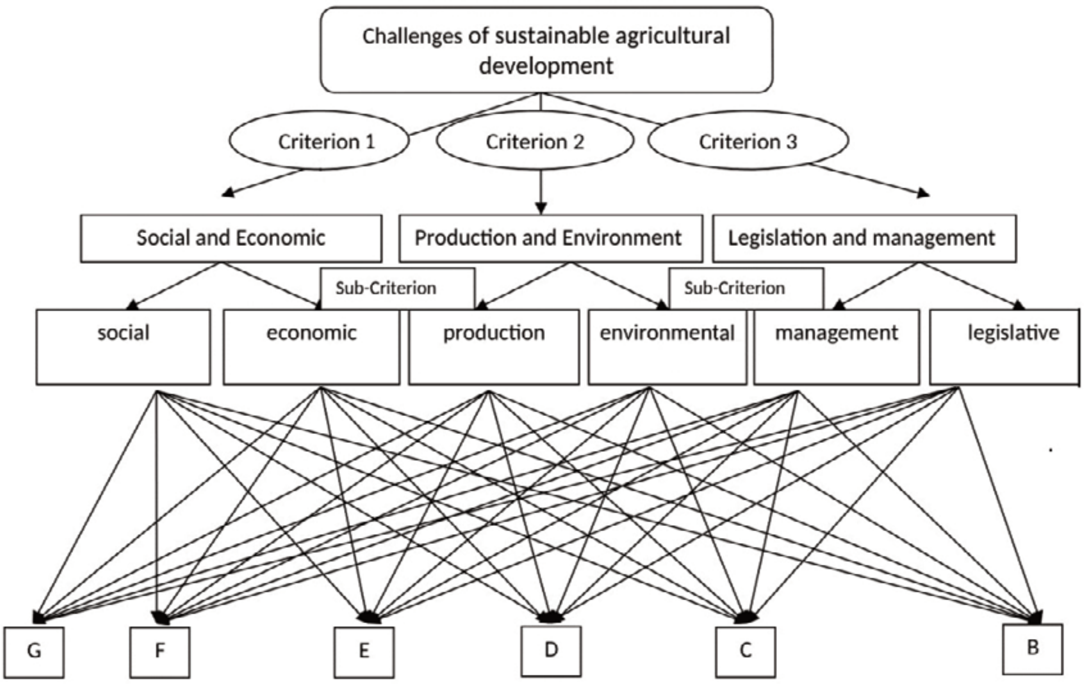

Figure 2. The Decision Tree That Was Designed by Expert Choice Software.

Table 2

Axial Coding Related to the Challenges of Sustainable Agricultural Development.

Axial Code	Categories	Concepts (Initial codes)	Repetitions
Challenges of Sustainable Agricultural Development	Shortage of infrastructure facilities (70 Repetitions)	Shortage of proper market infrastructure for products with a sustainable and organic approach	15
		Shortage of proper conversion and packaging industries	13
		Shortage of necessary educational infrastructure in rural areas	15
		Shortage of necessary physical and equipment infrastructure	13
		Shortage of transport and export infrastructure	10
	Shortage of credit and financial capital (69 Repetitions)	Shortage of sufficient credit for agricultural insurance	12
		High costs of sustainable agricultural production	11
		Low credits for sustainable agricultural development training programs	15
		Shortage of development credits and infrastructure in the field of sustainable agriculture	14
		Shortage of financial resources to provide conservational machinery	12
		Shortage of adequate financial infrastructure	9
	Weakness in human resources (75 Repetitions)	Low technical knowledge of sustainability among farmers	17
		Low technical knowledge of sustainability among experts	14
		Failure to hold sustainable agricultural management training courses	15
		Shortage of training needs assessment in the field of sustainability	18
		Shortage of development of a culture of using sustainable agricultural products	11
	Weaknesses in legislation and sustainability policy (56 Repetitions)	Shortage of institutionalization of principles, foundations and strategies of sustainable agriculture	10
		Shortage of transparency of insurance laws	11
		Shortage of policies to manage price risk in the region's agriculture	12
		Failure to pay attention to environmental protection laws	11
		Shortage of proper implementation policies for sustainable agricultural development	12
	Weaknesses in management and planning (76 Repetitions)	Shortage of proper crop rotation management plans	18
		Shortage of managerial and executive studies of favorable land management in the region and proper cultivation pattern	19
		Shortage of planning for conducting sustainability research tailored to the conditions of the region	21
		Shortage of planning educational and extension programs with sustainable agricultural content	18
	Shortage of attention to environmental studies (71 Repetitions)	Implementation of projects without regard to environmental attachments	17
		Improper use of chemical inputs	18
		Improper use of agricultural implements	17
		Land use change and the spread of environmental hazards	19

parison process (Figure 3), the results were aggregated to determine the final weight and ranking of each challenge. The final priority and weight of each challenge, based on the established criteria, were determined using Expert Choice software (Figure 4).

Figure 5 presents the geometric mean matrix. It is important to note that the geometric mean is the only method that preserves the first axiom of AHP (Axiom 1: If A = nB, then B = 1/nA), ensuring that the matrix remains reciprocal.

Sensitivity analysis

In sensitivity analysis, the ranking of the challenges of sustainable agricultural development is examined based on changes in the weight of criteria. This analysis is conducted

Ideal mode	Pairwise	Pairwise	Pairwise	Pairwise	Pairwise	Pairwise
Alternative	Social and Economic Social (L: 800)	Social and Economic Economic (L: 200)	Production and Environment Production (L: 250)	Production and Environment Environment (L: 750)	Legislation and management Legislation (L: 200)	Legislation and management management (L: 800)
Weaknesses in legislation and sustainability policy	.160	.238	.127	.141	.708	.138
Shortage of credit and financial capital	.113	1.000	.295	.296	.579	.254
Weakness in human resources	.441	.360	.304	.268	.383	.378
Shortage of attention to environmental studies	.336	.486	.153	.561	.270	.189
Shortage of infrastructure facilities	.148	.815	.460	.464	.292	.275
Weaknesses in management and planning	1.000	.772	1.000	1.000	1.000	1.000

Figure 3. Pairwise Comparison Matrix.

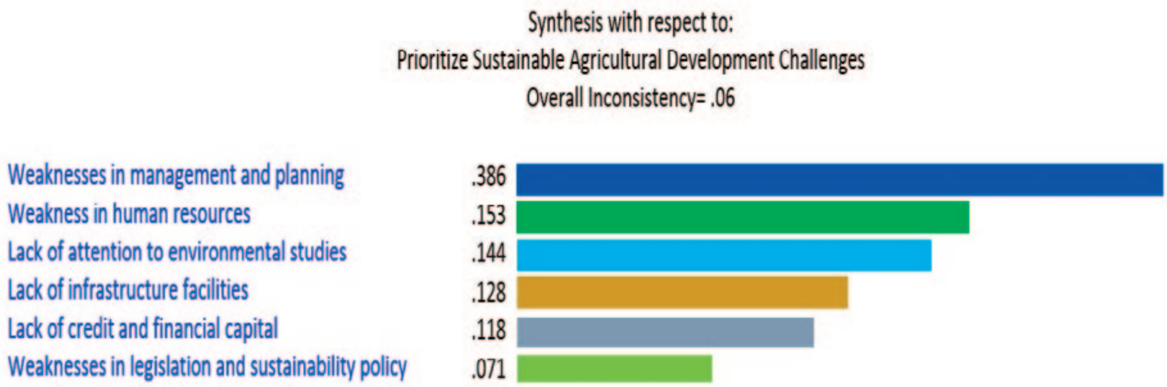

Figure 4. The Final Weight of the Challenges is Based on the Synthesized Criteria of the Research.

Alternative	Weaknesses in legislation and sustainability policy	Shortage of credit and financial capital	Weakness in human resources	Shortage of infrastructure facilities	Weaknesses in management and planning	Weaknesses in management and planning
Weaknesses in legislation and sustainability policy	1.00	0.64	0.53	0.44	0.59	0.29
Shortage of credit and financial capital	1.03	1.00	0.54	0.49	0.48	0.31
Weakness in human resources	1.11	1.21	1.00	1.13	1.09	0.45
Shortage of attention to environmental studies	1.10	1.23	0.46	1.00	1.07	0.38
Shortage of infrastructure facilities	1.09	1.13	0.43	0.52	1.00	0.31
Weaknesses in management and planning	2.17	1.98	1.79	2.09	1.43	1.00

Figure 5. Geometric Mean Matrix.

using methods such as dynamic, performance, gradient, head-to-head, and two-dimensional approaches. In sensitivity analysis using the performance method, the criteria are represented on the horizontal axis, while the decision options (challenges) are displayed on the vertical axis. The intersection of the challenge lines with the vertical lines representing the criteria indicates the weight of each challenge concerning that criterion (Figure 6).

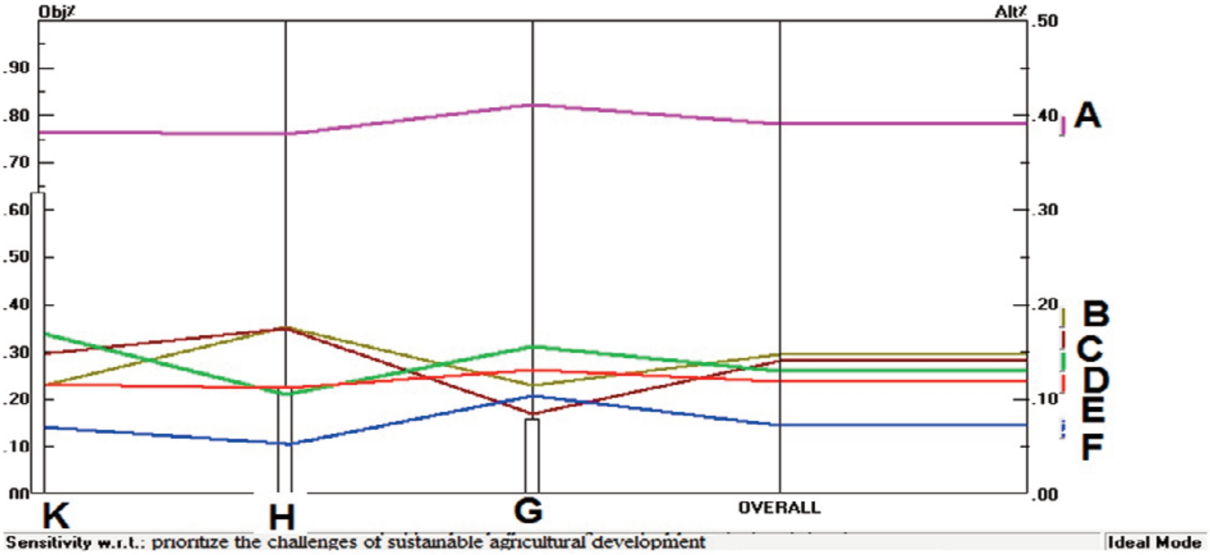

Figure 6. Sensitivity Analysis of the Challenges of Sustainable Agricultural Development in Performance Method.

CONCLUSION AND RECOMMENDATION

Based on a qualitative study conducted through grounded theory, the challenges of sustainable agricultural development were identified in three stages of coding. In this research, the challenges were identified through open coding, axial coding, and selective coding using MAXQDA 12 software. The challenges were then prioritized according to the criteria of sustainable agricultural development using AHP.

The first category, identified as the most significant challenge, was weaknesses in management and planning. The initial codes associated with this challenge were: a shortage of proper crop rotation management plans, a lack of managerial and executive studies on favorable land management and proper cultivation patterns, insufficient planning for sustainability research tailored to regional conditions, and inadequate planning for educational and extension programs with sustainable agricultural content. To address these weaknesses, it is recommended to design appropriate rotation management programs, conduct managerial and executive studies on optimal land management and cultivation patterns, properly plan sustainable research suited to regional conditions, and develop educational and extension programs with sustainable agricultural content.

The second category was weaknesses in human resources, identified as the second challenge. The initial codes related to this challenge included: low technical knowledge of sustainability among farmers and experts, the failure to conduct training courses on sustainable agricultural management, inadequate assessment of training needs in sustainability, and the lack of a culture promoting the use of sustainable agricultural products. To develop human resources in the agricultural sector, it is recommended to conduct regular educational, specialized, and extension programs for farmers and experts. The educational needs of farmers in sustainability should be assessed through participatory methods, and efforts should be made to promote the use of sustainable agricultural products.

The third category was a lack of attention to environmental studies, identified as the third challenge. The initial codes included: the implementation of projects without considering environmental impact assessments, the improper use of chemical inputs, the inappropriate use of agricultural implements, and land use changes leading to environmental hazards. To mitigate these challenges, it is recommended to incorporate environmental impact assessments in all agricultural projects, optimize the use of chemical inputs, prioritize the use of internal rather than external inputs, utilize agricultural machinery that minimizes soil erosion, and prevent land use changes in agricultural areas.

The fourth category was inadequate infrastructure facilities, identified as the fourth challenge. The initial codes included: insufficient market infrastructure for products with a sustainable and organic approach, a lack of proper conversion and packaging industries, inadequate educational infrastructure in rural areas, and a shortage of necessary physical and equipment infrastructure. To address these challenges, it is recommended to develop appropriate market infrastructure for sustainable and organic products, establish conversion and packaging industries to increase added value, set up necessary educational infrastructure in rural areas for implementing educational and extension programs, and develop the physical infrastructure and equipment required for sustainable agricultural products.

The fifth category was a shortage of credit and financial capital, identified as the fifth challenge. The initial codes included: insufficient credit for agricultural insurance, high costs of sustainable agricultural production, low funding for training programs in sustainable agriculture, limited development credits and infrastructure in sustainable agriculture, and a lack of financial resources for conservation-oriented machinery. To overcome these challenges, it is recommended to allocate sufficient credit for agricultural insurance, support farmers in covering the high costs of sustainable agricultural production, secure funding for sustainable agriculture training programs, provide development credit and infrastructure, and ensure financial resources for conservation-oriented machinery.

The sixth category was weaknesses in legislation and sustainability policy, identified as the sixth challenge. The initial codes included: a lack of institutionalization of the principles, foundations, and strategies of sustainable agriculture, insufficient transparency in insurance laws, inadequate policies for managing price risks in regional agriculture, a failure to enforce environmental protection laws, and the absence of proper implementation policies for sustainable agricultural development. To address these issues, it is recommended to institutionalize the principles, foundations, and strategies of sustainable agriculture, ensure transparency in insurance regulations, establish policies for price risk management in regional agriculture, enforce environmental protection laws, and implement appropriate policies and planning for sustainable agricultural development.

The novelty of this study lies in the fact that no similar research has been conducted in the region. The most significant application of this study is that by addressing the identified challenges, a suitable environment for sustainable agricultural development can be created. However, a key limitation is the lack of generalizability of the findings to other regions. Identifying strategies to overcome these challenges is a critical direction for future research.

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AUTHOR CONTRIBUTIONS

Keivan Torfi: Writing– Original draft, formal analysis. Ahmad Reza Ommani: Writing–original draft, Writing–review and editing, project administration, analysis and interpretation of results. Azadeh N. Noorivandi: Validation, consulting and supervision on data collection, methodology, analysis and interpretation of results. Mohamad Sadegh Sabouri: Conceptualization, visualization.

CONFLICT OF INTERESTS

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

REFERENCES

Abdeshahi, A., Mardani Najafabadi, M., & Zeinali, M. (2020). Determining the optimal cropping pattern of agricultural crops in Mollasani County of Iran: Application of robust multi-objective optimization model. *Agricultural Economics and Development, 28*(3), 175-203.

Abro, A., & Awan, N. W. (2020). Comparative analysis of profitability of major and minor crops in Pakistan. *Journal of the Saudi Society of Agricultural Sciences, 19*(7), 476-481.

AgNews. (2020). Iran pesticide production up 31% in eight months. Retrieved January 20, 2020, from http://news.agropages.com/News/NewsDetail—-33612.htm

Amanpour, S., Abiyat, M., & Abiyat, M. (2021). Investigation of the effect of land use change on soil erosion and sediment production in Ramhormoz Basin using object-oriented classification and RUSLE model. *Iranian Journal of Soil and Water Research, 52*(3), 635-649.

Asimeh, M., Nooripoor, M., Azadi, H., Eetvelde, V., Sklenička, P., & Witlox, F. (2020). Agricultural land use sustainability in Southwest Iran: Improving land leveling using consolidation plans. *Land Use Policy, 94*, 104555.

Ataei, P., Sadighi, H., Aenis, T., Chizari, M., & Abbasi, E. (2021). Challenges of applying conservation agriculture in Iran: An overview on experts' and farmers' perspectives. *Air, Soil and Water Research, 14*, 1–12.

Charmaz, K., & Thornberg, R. (2021). The pursuit of quality in grounded theory. *Qualitative Research in Psychology, 18*(3), 305–327.

Fang, J., & Partovi, F. Y. (2021). Criteria determination of analytic hierarchy process using a topic model. *Expert Systems with Applications, 169*, 114306. https://doi.org/10.1016/j.eswa.2020.114306

FAO. (2020). *World food and agriculture - Statistical yearbook 2020*. Rome.

Hartmann, T. E., Guzman-Bustamante, I., Ruser, R., & Müller, T. (2020). Turnover of urea in a soil from the North China Plain as affected by the urease inhibitor NBPT and wheat straw. *Agronomy, 10*, 857.

Hesampour, R., Hassani, M., Hanafiah, M. M., & Heidarbeigi, K. (2022). Technical efficiency, sensitivity analysis and economic assessment applying data envelopment analysis approach: A case study of date production in Khuzestan State of Iran. Journal of the Saudi Society of Agricultural Sciences, 21(3), 197-207.

IFA. (2021). *Public summary medium-term fertilizer outlook 2021 – 2025, Market Intelligence Service.* International Fertilizer Association. https://www.ifastat.org/market-outlooks

Kaabi, A., Roosta, K., Mohammadzadeh, S., & Baradaran, R. (2021). Solutions to reduce the vulnerability of farmers and beneficiaries of the agricultural sector to climate change. *International Journal of Agricultural Management and Development, 11*(1), 137-159.

Kalantaryan, S., Scipioni, M., Natale, F., & Alessandrini, A. (2021). Immigration and integration in rural areas and the agricultural sector: An EU perspective. Journal of Rural Studies, 88, 462-472.

Maleksaeidi, H., Jalali, M., & Eskandari, F. (2021). Challenges threatening agricultural sustainability in the West of Iran: Viewpoint of agricultural experts. *Sustainability, 13*, 3537.

Moridsadat, P., & Roknoddin Eftekhari, A. (2018). Strategic analysis of sustainable agriculture with entrepreneurial approach (Case study: Khuzestan Province). *Regional Planning, 8*(30), 31-50.

Mujumdar, A., Tiwari, A., Agarwal, A., & Prajapat, A. (2021). A new case of rank reversal in analytic hierarchy process due to aggregation of cost and benefit criteria. *Operations Research Perspectives, 8*, 100185.

Ommani, A. R. (2019). Analysis of sustainable water resources management (SWRM) in agriculture in Khuzestan Province, Iran. *International Journal of Agricultural Sciences, 9*(5), 1-6.

Rani, L., Thapa, K., Kanojia, N., Sharma, N., Singh, S., Grewal, A. S., ... & Kaushal, J. (2021). An extensive review on the consequences of chemical pesticides on human health and environment. Journal of cleaner production, 283, 124657.

Skrimizea, E., Lecuyer, L., Bunnefeld, N., Butler, J., Fickel, T., Hodgson, I., Holtkamp, C., et al. (2020). Sustainable agriculture: Recognizing the potential of conflict as a positive driver for transformative change. In D. A. Bohan & A. J. Vanbergen (Eds.), *Advances in Ecological Research, 63*, 255-311. Academic Press.

Vogel, G., Joelsson-Alm, E., Forinder, U., Svensen, C., & Sandgren, A. (2021). Stabilizing life: A grounded theory of surviving critical illness. Intensive and Critical Care Nursing, 67, 103096.

Wang, T., Wang, Z., Guo, L., Zhang, J., Li, W., He, H., Zong, R., Wang, D., Jia, Z., & Wen, Y. (2021). Experiences and challenges of agricultural development in an artificial oasis: A review. *Agricultural Systems, 193*, 103220.

Yu, M., & Smith, S. M. (2021). Grounded theory: A guide for a new generation of researchers. *International Journal of Doctoral Studies, 16*, 553-568.

Zhang, X., Yao, G., Vishwakarma, S., Dalin, C., Komarek, A., Kanter, D., Davis, K. F., Pfeifer, K., Zhao, J., et al. (2021). Quantitative assessment of agricultural sustainability reveals divergent priorities among nations. *One Earth, 4*(9), 1262-1277.

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