Exploring Agricultural Mechanization Opportunities and Challenges in Nimrooz, Afghanistan: A case of Chahar Borjak District

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Abstract

This study investigates the opportunities and challenges of agricultural mechanization in Chahar Burjak district of Nimrooz Province, with a focus on identifying key enabling and constraining factors influencing sustainable agricultural development. The research is applied in purpose and employs a descriptive survey methodology. Data were collected using a structured questionnaire designed on a five point Likert scale. The collected data were analyzed using SPSS software through the one sample t-test and the Friedman rank test to assess the significance and prioritization of the identified variables. The statistical population comprised farmers in Chahar Burjak district, from which a sample of 183 respondents was determined using Cochran's formula and selected through non-probability convenience sampling. The findings reveal that among the existing opportunities, the adoption of modern irrigation technologies particularly drip irrigation constitutes the most significant factor in enhancing agricultural productivity and optimizing water use efficiency, ranking first among opportunity indicators (14.85). Conversely, water scarcity and recurrent droughts emerged as the most critical challenges (14.56), severely restricting the expansion of mechanization and undermining sustainable agricultural development. The study concludes that effective policy support, improved access to mechanized technologies, and integrated water resource management are essential to maximizing existing opportunities while mitigating structural and environmental constraints. Strengthening these dimensions can contribute to

increased productivity, resource efficiency, and improved livelihoods for farmers in Nimrooz Province.

Keywords: Agricultural Mechanization, Farmers, Challenges, Nimrooz Province, Opportunities

Introduction

Agriculture, as one of the most ancient and vital economic activities of humankind, plays an irreplaceable role in ensuring food security, generating employment, and achieving sustainable development (Kazemi et al., 2023). It drives economic growth, especially in developing countries (Raoufi et al., 2022). Sustainable management of water, soil, and climate is key. New technologies, efficient irrigation, improved seeds, and integrated management have turned agriculture into a knowledge-based enterprise (Ahmadi et al., 2020). Drones, remote sensing, smart irrigation, and biotechnology reduce ecological footprints while boosting productivity (Karimi et al., 2023). However, farmers in rural areas face obstacles such as limited access to quality inputs, lack of capital, inefficient irrigation, and unreliable markets (Walford et al., 2023; Mousavi et al., 2022). The digital divide between small and large farmers is deepening, leading to rural migration and farmland abandonment (Nikkhah et al., 2021). Unsustainable practices cause soil erosion, groundwater decline, and pollution (Nikifar et al., 2023). A sustainable agricultural model requires institutional strengthening, rural infrastructure investment, and farmer empowerment through training and financial services (Maleki et al., 2020). Policies should create incentives and protect farmers from market fluctuations. Strengthening value chains and direct producer-consumer links can increase profits (Zaringadam et al., 2021). Previous studies examined agricultural challenges: Ahmadi et al. (2020) found water wastage and local conflicts in southern Afghanistan. Karimi et al. (2019) reported climate-driven shifts to low-water crops in Iran. Hosseini et al. (2021) cited intermediaries and lack of price information as profit barriers. Ministry of Agriculture (2020) noted limited success in seed and irrigation projects in Nimroz. Yousefi et al. (2018) showed microfinance improved working capital. Economic Research Institute (2017) found saffron more profitable than wheat. Akbari et al. (2022) reported short-term NGO impacts. UNDP (2021) highlighted high rural food insecurity. Mohammadi et al. (2016) found the Mirab system challenged by population and water scarcity. World Bank (2020) identified irrigation, market, and shock

vulnerability gaps. Gholami et al. (2022) cited sanitary and logistical barriers to exports. Naderi et al. (2019) found extension training increased wheat yields. USAID (2020) reported only temporary employment from projects. Rahmani et al. (2020) found Badakhshan suitable for medicinal plants. Center for Peace and Development Studies (2018) found insecurity correlated with reduced cultivation.

The central issue of the present research is that, despite the natural capacities and suitable geographical location of Chahar Burjak District in Nimrooz Province for agricultural activities, it appears that a combination of technical, economic, and structural challenges has hindered the full realization of this potential, confronting farmers with numerous difficulties in the process of production and marketing of agricultural products. This research seeks to scientifically identify these challenges and existing opportunities from the perspective of the key stakeholders—the farmers of this district. This study specifically examines the opportunities and challenges of agricultural mechanization in Chahar Burjak District, Nimrooz Province. As a significant agricultural area in southwestern Afghanistan, Chahar Burjak District possesses considerable potential, which seems underutilized for various reasons. This research provides an in-depth analysis of the obstacles and identification of existing opportunities in this district. By focusing on the farmers of Chahar Burjak, it aims to present a clear picture of the existing realities through field investigation. A precise understanding of the conditions faced by the farmers of Chahar Burjak can lead to the development of practical solutions for improving livelihoods and achieving sustainable agricultural development in this district.

This research is fundamentally important because the agricultural sector is the main livelihood for Chahar Burjak District residents. Scientifically identifying its opportunities and challenges provides a precise roadmap for planners, government institutions, and international organizations. The findings will directly inform operational strategies and evidence-based policies, leading to increased efficiency, sustainable production, improved farmer livelihoods, and poverty reduction in this deprived district. Without

this research, developmental investments lacking local context understanding risk failure.

The urgency of this research is heightened by climate change and consecutive droughts in the Helmand River Basin, which threaten food security and livelihoods in Chahar Burjak District. Afghanistan's dire economic situation, rising input prices, and the need for sustainable employment demand immediate attention to agriculture. Any delay will exacerbate challenges, increase future costs, accelerate natural resource degradation, force rural migration, and cause irreversible loss of development opportunities in this strategic district

This study aims to Identify and prioritize the key opportunities and challenges of agricultural mechanization in Chahar Burjak District, Nimrooz Province, and to develop practical recommendations to enhance agricultural sustainability and productivity in the region.

This study seeks to determine the key opportunities and challenges of agricultural mechanization in Chahar Burjak District, Nimrooz Province and in identify their relative significance.

Research Method

The present study is an applied research in terms of its purpose and quantitative-survey in terms of its methodology. The required data were collected using a 5-point Likert scale questionnaire. The statistical population of this research consisted of farmers in Chahar Burjak District, Nimrooz Province (N = 350). The sample size was determined to be 183 individuals using the Cochran's formula, and the sample members were selected through a non-probability convenience sampling method.

$$n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N}(\frac{z^2 pq}{d^2} - 1)} = \frac{\frac{3.84^2 0.5 * 0.5}{0.05^2}}{1 + \frac{1}{350}(\frac{3.84^2 0.5 * 0.5}{0.05^2} - 1)} = 183.39 = 183$$

The questionnaire contained 15 items measuring opportunities and 15 items measuring challenges. The concepts in table (4) and (8) were determined through a deductive-thematic analysis of the

quantitive survey data. After confirming the significance of each questionnaire item via one simple t-test, items sharing common themes were grouped to form “Basic Concepts.” These were then synthesized into broader, abstract categories, resulting in the “Main Concepts.” This process ensured the conceptual framework was both data-driven and theoretically structured. The validity of the questionnaire was assessed and confirmed through expert judgment by specialists in the field of agriculture. The reliability of the questionnaire was measured using Cronbach's alpha coefficient. The results of Cronbach's alpha, presented in Table (1), demonstrate that the research questionnaire possesses high reliability.

Table 1: Cronbach's Alpha Coefficient

Variable	Number of Items	Cronbach's Alpha Coefficient
Opportunities	15	0.925
Challenges	15	0.910
Total Cronbach's Alpha	30	0.945

The data collected via the questionnaire were analyzed using SPSS software. To assess the significance of the opportunities and challenges, a One-Sample T-Test was employed. Furthermore, to rank them relative to each other, the Friedman Rank Test was used.

Results

1. Descriptive Findings

The findings of this research are presented in two sections: descriptive and inferential. The descriptive section examines the components of age, education level, work experience in agriculture, and amount of agricultural land, as detailed in Table (2).

Table 2: Characteristics of the Research Participants (N=183)

Variable		Frequency	Percentage
Age	21-30 Years	13	7.1
	31-40 Years	40	21.8
	41-50 Years	110	60.2
	Over 50 years	20	10.9
	Total	183	100
Education Level	Illiterate	98	53.5
	Secondary School	40	21.8
	High School Diploma (Baccalaureate)	30	16.3

	Associate Degree	11	6.3
	Bachelor's Degree	4	2.1
	Total	183	100
Work Experience in Agriculture	1-5 Years	30	16.4
	6-10 Years	113	61.7
	11-15 Years	32	17.6
	16-20 Years	6	3.2
	Over 20 Years	2	1.1
	Total	183	100
Amount of Agricultural Land	Less than 1 Jerib	20	10.9
	1-3 Jerib	43	23.6
	4-6 Jerib	92	50.3
	7-10 Jerib	25	13.6
	More than 10 Jerib	3	1.6
	Total	183	100

Based on the findings in Table (2), It was determined that the majority of participants In this research were between 41 and 50 years old, comprising 110 individuals, which is equivalent to 60.2% of the total sample. Furthermore, the largest proportion of the sample members were illiterate, with 98 individuals (53.5%). The work experiencee in agriculture for the majority of the sample members (113 individuals, or 61.7%) was between 6 and 10 years. Regarding the amount of agricultural land, the majority of the sample members (92 individuals, or 50.3%) possessed between 4 to 6 Jeribs of agricultural land.

2. Inferential Findings

The inferential findings are presented in two parts: a one-sample t-test was used to assess the opportunities and challenges, and the Friedman test was used for ranking and prioritizing the opportunities and challenges.

Table 3: Mean of Existing Opportunities for Agricultural Mechanization (N=183)

No.	Statements	N	Mean	Std. Deviation	t-test	Df	Sig.
1	Farmers' access to fertile land and water resources facilitates sustainable agricultural development.	183	3.80	.523	16.910	182	0.001
2	The use of modern irrigation techniques (such as drip irrigation) leads to a significant increase in crop efficiency.	183	4.85	.740	18.650	182	0.001
3	Farmers' access to quality seeds and saplings improves the growth of crops.	183	4.20	.650	16.265	182	0.001
4	The ability to utilize local markets increases farmers' motivation to cultivate diverse crops.	183	4.35	.680	15.695	182	0.001
5	Effective training and awareness for farmers in the agricultural sector leads to better management of land and crops.	183	4.22	.940	12.303	182	0.001

6	Access to fertilizers and pesticides increases the quality and quantity of crops.	183	3.70	.850	17.632	182	0.001
7	Utilizing the local and traditional experiences of farmers enhances successful farming methods.	183	4.45	.835	16.368	182	0.001
8	The possibility of using simple agricultural machinery reduces physical labor and increases efficiency.	183	4.27	.760	16.232	182	0.001
9	Support from government institutions and non-governmental organizations facilitates sustainable agricultural development.	183	4.25	.560	14.357	182	0.001
10	Cooperation and collaboration among farmers leads to improved performance and reduced problems in the agricultural sector.	183	4.32	.824	12.923	182	0.001

11	Agricultural machinery helps in the regular and correct application of fertilizer and seeds in farmlands.	183	3.90	.695	11.870	182	0.001
12	Agricultural mechanization reduces crop waste.	183	4.30	.964	14.423	182	0.001
13	Using modern agricultural technologies makes it easier for farmers to monitor land conditions.	183	4.65	.560	11.450	182	0.001
14	The use of agricultural machinery makes it easier to cultivate diverse plants in multiple cycles per year.	183	4.28	.790	13.630	182	0.001
15	The use of agricultural machinery helps in better planning for planting and harvesting crops.	183	4.40	.990	10.487	182	0.001

Based on the t-test results, the mean perception of respondents regarding the existing opportunities for agricultural mechanization in Chahar Burjak District, Nimrooz Province is significantly higher than the average level (3) (df=182, p=0.001). This indicates relatively good opportunities for agricultural mechanization in Chahar Burjak District, Nimrooz Province. In summary, the opportunities in Table (4) are categorized into the following overarching variables:

Table 4: Extraction of Main Concepts for Agricultural Mechanization

No.	Main Concepts	Basic Concepts
1	Sustainable Management of Production Resources	Access to fertile land and water resources, effective soil management, reduced water consumption.
2	Technology Development and Agricultural Mechanization	Use of modern irrigation techniques, agricultural mechanization, use of simple and advanced machinery.
3	Supply of Quality Production Inputs	Access to improved seeds and saplings, supply of standard chemical fertilizers and pesticides.
4	Market Development and Economic Factors	Access to local markets, diversification of agricultural products, increased income, reduced costs.
5	Capacity Building and Training	Training and awareness-raising for farmers, promotion of successful local and traditional methods.
6	Institutional Support and Collective Cooperation	Support from government and non-governmental institutions, cooperation and collaboration among farmers.
7	Increased Efficiency and Waste Reduction Better planning	For planting and harvesting, reduction of crop waste, monitoring of land conditions.

Based on the findings in Table (4), it was determined that sustainable management of production resources, technology development and agricultural mechanization, supply of quality production inputs, market development and economic factors, capacity building and training, institutional support and collective cooperation, and increased efficiency and waste reduction are among the existing opportunities applicable to agricultural mechanization in Chahar Burjak District, Nimrooz Province.

Table 5: Mean Rank of Opportunities

No.	Opportunities	Mean Rank	Priority
1	Farmers' access to fertile land and water resources facilitates sustainable agricultural development.	13.80	14
2	The use of modern irrigation techniques (such as drip irrigation) leads to a significant increase in crop efficiency.	14.85	1
3	Farmers' access to quality seeds and saplings improves the growth of crops.	14.20	12
4	The ability to utilize local markets increases farmers' motivation to cultivate diverse crops.	14.35	5

5	Effective training and awareness for farmers in the agricultural sector leads to better management of land and crops.	14.22	11
6	Access to fertilizers and pesticides increases the quality and quantity of crops.	13.70	15
7	Utilizing the local and traditional experiences of farmers enhances successful farming methods.	14.45	3
8	The possibility of using simple agricultural machinery reduces physical labor and increases efficiency.	14.27	9
9	Support from government institutions and non-governmental organizations facilitates sustainable agricultural development.	14.25	10
10	Cooperation and collaboration among farmers leads to improved performance and reduced problems in the agricultural sector.	14.32	6
11	Agricultural machinery helps in the regular and correct application of fertilizer and seeds in farmlands.	13.90	13
12	Agricultural mechanization reduces crop waste.	14.30	7
13	Using modern agricultural technologies makes it easier for farmers to monitor land conditions.	14.65	2
14	The use of agricultural machinery makes it easier to cultivate diverse plants in multiple cycles per year.	14.28	8
15	The use of agricultural machinery helps in better planning for planting and harvesting crops.	14.40	4

Table 6: Friedman Test Statistics

N	183
Chi-Square	240.671
df	14
Sig.	0.001

Based on the findings in Table (5) and considering the results in Table (6), it was found that the use of modern irrigation techniques (such as drip irrigation), which increases crop efficiency, has the highest rank (14.85). Given that the p-value is less than $0.001 < 0.05$, we conclude that there are significant differences among the existing opportunities for agricultural mechanization in Nimrooz Province.

Table 7: Mean of Challenges in Agricultural Mechanization (N=183)

No.	Statements	N	Mean	Std. Deviation	t-test	Df	Sig.
1	Water scarcity and consecutive droughts limit the process of sustainable agricultural development.	183	4.56	.654	13.670	182	0.001
2	Limited access to modern technologies and agricultural machinery reduces crop production.	183	4.16	.825	15.290	182	0.001
3	Shortage of suitable seeds and saplings reduces the quality and quantity of crops.	183	4.29	.896	11.320	182	0.001
4	Lack of agricultural training and knowledge leads to inefficient management of land and crops.	183	4.28	.760	12.490	182	0.001
5	Transportation and market problems for selling crops limit farmers' access to adequate income.	183	4.35	.795	13.451	182	0.001
6	Financial and capital constraints reduce farmers' ability for sustainable agricultural development.	183	4.40	.930	13.890	182	0.001

7	The presence of plant diseases and pests causes significant damage to crops.	183	4.25	.730	15.604	182	0.001
8	Climate and weather changes affect the yield and timing of planting and harvesting crops.	183	4.34	.685	18.395	182	0.001
9	Limited access to chemical fertilizers and pesticides reduces the quality of crops.	183	4.48	.708	14.290	182	0.001
10	Cultural and social problems in cooperation among farmers reduce the coordination and efficiency of agricultural activities.	183	4.32	.769	12.469	182	0.001
11	Some mountainous or inaccessible areas are not suitable for using agricultural machinery.	183	3.27	.894	11.250	182	0.001
12	Lack of sufficient experience leads to errors in working with agricultural machinery.	183	4.18	.735	17.259	182	0.001

13	There is a possibility of theft or damage to agricultural machinery.	183	3.08	.790	10.180	182	0.001
14	Weather conditions in Nimruz Province sometimes hinder the proper use of agricultural machinery.	183	4.24	.862	13.320	182	0.001
15	Some farmers may not trust new technologies.	183	4.10	.780	11.350	182	0.001

Based on the t-test results, the mean perception of respondents regarding the existing challenges of agricultural mechanization in Chahar Burjak District, Nimrooz Province is significantly higher than the average level (3) (p=0.001), Indicating relatively serious challenges for agricultural mechanization in Chahar Burjak District, Nimrooz Province. In summary, the challenges in Table (7) are categorized into the following overarching variables:

Table 8: Extraction of Main Concepts in the Challenges of Agricultural Mechanization

No.	Main Concepts	Basic Concepts
1	Environmental and Biophysical Constraints	Water scarcity, consecutive droughts, climate and weather changes, presence of plant diseases and pest, unfavorable weather conditions in Nimrooz Province.
2	Infrastructural and Technical Limitations	Limited access to modern technologies and agricultural machinery, mountainous and inaccessible areas for using agricultural machinery.
3	Financial and Economic Obstacles	Financial and capital constraints, transportation and marketing problems for agricultural products, possibility of theft or damage to agricultural machinery.
4	Shortage of Production Inputs	Shortage of suitable seeds and saplings, limited access to chemical fertilizers and pesticides.
5	Lack of Agricultural Knowledge and Skills	Lack of agricultural training and knowledge, insufficient experience in working with agricultural machinery.

6	Cultural and Social Problems	Cultural and social problems in cooperation among farmers, lack of trust among some farmers towards new technologies.
7	Environmental Threats	Soil erosions, loss of biodiversity, chemical runoff and pollution from agricultural inputs.

Based on the findings in Table (8), It was determined that environmental and climatic challenges, infrastructural and technical limitations, financial and economic obstacles, shortage of standard production inputs (such as saplings, improved seeds, and chemical fertilizers), lack of agricultural knowledge and skills, cultural and social problems, and environmental threats are among the serious challenges for agricultural mechanization in Chahar Burjak District, Nimrooz Province.

Table 9: Mean Rank of Challenges

No.	Opportunities	Mean Rank	Priority
1	Water scarcity and consecutive droughts limit the process of sustainable agricultural development.	14.56	1
2	Limited access to modern technologies and agricultural machinery reduces crop production.	14.16	13
3	Shortage of suitable seeds and saplings reduces the quality and quantity of crops.	14.29	7
4	Lack of agricultural training and knowledge leads to inefficient management of land and crops.	14.28	8
5	Transportation and market problems for selling crops limit farmers' access to adequate income.	14.35	4
6	Financial and capital constraints reduce farmers' ability for sustainable agricultural development.	14.40	3
7	The presence of plant diseases and pests causes significant damage to crops.	14.25	10
8	Climate and weather changes affect the yield and timing of planting and harvesting crops.	14.34	5
9	Limited access to chemical fertilizers and pesticides reduces the quality of crops.	14.48	2
10	Cultural and social problems in cooperation among farmers reduce the coordination and efficiency of agricultural activities.	14.32	6
11	Some mountainous or inaccessible areas are not suitable for using agricultural machinery.	13.27	9
12	Lack of sufficient experience leads to errors in working with agricultural machinery.	14.18	12
13	There is a possibility of theft or damage to agricultural machinery.	13.08	15

14	Weather conditions in Nimruz Province sometimes hinder the proper use of agricultural machinery.	14.24	11
15	Some farmers may not trust new technologies.	14.10	14

Table 10: Friedman Test Statistics

N	183
Chi-Square	99.765
df	14
Sig.	0.001

Based on the findings in Table (9) and considering the results in Table (10), it was found that the challenge of water scarcity and consecutive droughts, which limits the process of sustainable agricultural development, has the highest rank (14.56). Given that the p-value is less than $0.001 < 0.05$, we conclude that there are significant differences among the existing challenges for agricultural mechanization in Chahar Burjak District, Nimrooz Province.

Discussion

The findings of this study reveal the coexistence of significant opportunities and structural challenges in the process of agricultural mechanization in Chahar Burjak District, Nimrooz Province. The highest-ranked opportunity was the adoption of modern irrigation techniques, particularly drip irrigation (mean rank = 14.85), which aligns with the findings of Kazemi et al. (2022) and Ahmadi et al. (2020), who emphasized the role of modern irrigation systems in improving productivity and coping with water scarcity. Similarly, the prioritization of new agricultural monitoring technologies (14.65) supports the results of Moghaddami et al. (2022) and Eskandari et al. (2021) regarding precision agriculture. The recognition of farmers' local experience (14.45) and cooperation among farmers is also consistent with Naderi et al. (2019) and Samimi et al. (2019), who highlighted the importance of extension services and institutional empowerment.

Regarding challenges, the identification of water scarcity and consecutive droughts as the primary constraint (14.56) confirms the findings of Amini et al. (2020) and the World Bank (2020) on Afghanistan's water crisis. However, the prioritization of limited access to quality fertilizers and pesticides (14.48) over financial constraints (14.40) diverges from broader reports such as Abdollahi

et al. (2022) and the World Bank (2020), indicating a region-specific supply chain gap. Moreover, the prominence of socio-cultural barriers and distrust of new technologies contrasts with findings from Herat Province (Naderi et al., 2019), highlighting the strong influence of local literacy levels and social context.

Overall, the results demonstrate that while the study largely aligns with existing literature, It also reveals context-specific divergences that underscore the necessity of localized, water-centered, and institutionally supported mechanization strategies in Nimrooz Province.

Conclusion

This study demonstrates that agricultural mechanization in Chahar Burjak District, Nimrooz Province, is shaped by both high-priority opportunities and critical constraints. The results confirm that respondents perceive both opportunities and challenges at significantly above-average levels, indicating strong development potential alongside serious structural barriers. Among the opportunities, the adoption of modern irrigation techniques, particularly drip irrigation (14.85), ranked first, followed by the use of new agricultural monitoring technologies (14.65) and reliance on local farmer experience (14.45).

In contrast, water scarcity and consecutive droughts (14.56) were identified as the most severe challenges, followed by limited access to chemical fertilizers and pesticides (14.48) and financial constraints (14.40). These prioritized findings highlight the central role of water management and input supply systems in determining the success of mechanization efforts.

Overall, sustainable agricultural development in the region requires integrated strategies that simultaneously strengthen technological adoption, ensure reliable access to quality production inputs, improve infrastructure, and address environmental pressures. Without resolving the water crisis and supply chain limitations, the potential benefits of mechanization cannot be fully realized in Chahar Burjak District.

Recommendations

1. The Directorate of Agriculture, Irrigation, and Livestock of Nimrooz Province should establish model farms to demonstrate and promote low-cost irrigation systems, particularly drip irrigation, among farmers in Chahar Burjak District.
2. The Ministry of Agriculture should develop direct distribution networks for standard agricultural inputs (saplings, seeds, fertilizers, and pesticides) and provide targeted financial support to farmers.
3. The Directorate of Rural Rehabilitation and Development should create small-scale agricultural loan funds with flexible collateral requirements to facilitate farmers' access to machinery and quality inputs.
4. The Directorate of Agriculture should organize practical training programs on farm management and pest and disease control, utilizing experienced local farmers as extension facilitators.
5. The Directorate of Public Works should improve rural road infrastructure to reduce transportation costs and enhance farmers' access to local markets.
6. Agricultural cooperatives should be established at the district level to support collective input procurement, joint marketing, and local dispute resolution.

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بررسی فرصت‌ها و چالش‌های میکانیزه سازی زراعت در نیمروز، افغانستان: مطالعه موردی ولسوالی چهاربرجک

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چکیده

این تحقیق به بررسی فرصت‌ها و چالش‌های میکانیزه سازی زراعت در ولسوالی چهاربرجک ولایت نیمروز می‌پردازد و با تمرکز بر شناسایی عوامل کلیدی تسهیل‌کننده و بازدارنده مؤثر بر توسعهٔ پایدار زراعت انجام شده است. این تحقیق از نظر هدف کاربردی بوده و با استفاده از روش توصیفی ـ پیمایشی اجرا گردیده است. اطلاعات از طریق پرسشنامه‌ای ساختاریافته بر اساس طیف پنج‌درجه‌ای لیکرت جمع‌آوری شد. اطلاعات جمع‌آوری‌شده با استفاده از برنامه SPSS و از طریق آزمون t تک‌نمونه‌ای و آزمون رتبه‌بندی فریدمن به‌منظور سنجش معناداری و اولویت‌بندی متغیرهای شناسایی‌شده تحلیل شدند. جامعه آماری شامل دهاقین ولسوالی چهاربرجک بوده که از میان آنان، بر اساس فرمول کوکران، 183 نفر به‌عنوان نمونه و به روش نمونه‌گیری در دسترس (غیراحتمالی) انتخاب شدند. یافته‌های تحقیق نشان داد که در میان فرصت‌های موجوده، به‌کارگیری تکنالوژی‌های نوین آبیاری، به‌ویژه آبیاری قطره‌ای، مهم‌ترین عامل در افزایش مؤثریت زراعت و افزایش کارایی مصرف آب بوده و در میان شاخص‌های فرصت در رتبه نخست (14.85) قرار دارد. در مقابل، کمبود آب و خشک‌سالی‌های مکرر به‌عنوان مهم‌ترین چالش‌ها (14.56) شناسایی شدند که گسترش میکانیزه سازی را محدود ساخته و توسعهٔ پایدار زراعت را تضعیف می‌کنند. نتایج تحقیق نشان می‌دهد که حمایت سیاستی مؤثر، بهبود دسترسی به تکنالوژی‌های میکانیزه و مدیریت یکپارچه منابع آب برای استفاده از فرصت‌های موجوده و کاهش محدودیت‌های ساختاری و زیست‌محیطی ضروری است. تقویت این ابعاد می‌تواند به افزایش مؤثریت، ارتقای کارایی منابع و بهبود معیشت دهاقین در ولایت نیمروز منجر شود.

کلمات کلیدی: چالش‌ها، دهاقین، فرصت‌ها، میکانیزه سازی زراعت، ولایت نیمروز