ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

Challenges and Opportunities in Rice Cultivation and Marketing of Cambodia: A Review Article

Horn Sarun[1,4,*]; Touch Pang[2]; Horn Linan[1]; In Sokra[2,3]; Rin Chanra[1]; Horn Meta[2]; Horn Hiek[1]; Long Sotheara[4]

[1]Department of Soil and Crop Production, Faculty of Agronomy, University of Kratie, Cambodia
[2]Department of Food Engineering, Faculty of Agro-Industry, University of Kratie, Cambodia
[3]Metabolic Engineering Research Unit, School of Biotechnology, Suranaree University of Technology, 111 University Avenue Suranaree, Muang Nakhon Ratchasima, 30000, Thailand
[4]Center of Agricultural and Environmental Studies, Faculty of Forestry Science, Royal University of Agriculture, Cambodia

*Corresponding Author: Horn Sarun

Publication Date: 2025/02/13

Abstract: Cambodia's rice cultivation and marketing sector faces many challenges and opportunities, reflecting a mix of traditional practices and modern advances. As one of Cambodia's most important sectors, agriculture, especially rice farming, is affected by issues such as climate change, water management, soil fertility, pests and diseases, infrastructure, access to technology, financial constraints, market access, policies and regulations, education and training. Farmers face low productivity and poor post-harvest management, leading to significant rice losses. In the market, rice producers deal with market access, exploitation by middlemen, quality control issues, lack of market infrastructure, limited market information, weak cooperatives, export barriers, financial constraints, policies and regulations, competition, branding and promotion, which hinder profitability. However, there are many opportunities for improvement despite these challenges. In recent years, the Cambodian government, supported by international organizations and development partners, has increasingly prioritized improving agricultural infrastructure and promoting sustainable agricultural practices and improving rice quality for export markets. Furthermore, advances in agricultural technology can also help improve market access and promote transparency in rice trade.

Keywords: *Rice Cultivation, Rice Marketing, Challenges and Opportunities, Cambodia.*

How to Cite: Horn Sarun; Touch Pang; Horn Linan; In Sokra; Rin Chanra; Horn Meta; Horn Hiek; Long Sotheara (2025). Challenges and Opportunities in Rice Cultivation and Marketing of Cambodia: A Review Article. *International Journal of Innovative Science and Research Technology*, 10(1), 2290-2299. https://doi.org/10.5281/zenodo.14862890

I. INTRODUCTION

➢ *Rice Production in Cambodia*

Rice is the cornerstone of Cambodia's agricultural sector, serving as the main staple food and a primary source of income for millions of rural households. The country is one of the largest rice producers in Southeast Asia, with rice cultivation occupying around 80% of its arable land (FAO, 2020). Cambodia's climate, characterized by a tropical monsoon system, is conducive to rice farming, with two main seasons: wet-season (rain-fed) rice cultivation, and dry-season rice farming using irrigation. Rice production not only contributes to domestic food security but also plays a significant role in the national economy through domestic consumption and exports. Despite its potential, the rice sector faces several challenges, including limited access to modern agricultural techniques, inadequate infrastructure, and vulnerability to climate change, which affects productivity and market stability (ADB, 2021).

Recent developments indicate that Cambodia's rice industry is evolving, as the government and international organizations push for improvements in irrigation, seed quality, and post-harvest management. In addition, there is increasing attention to improving the value chain to increase rice marketing and exports. As Cambodia's rice market becomes more integrated with international trade, new opportunities for growth have emerged, although challenges remain related to competition and market volatility (OECD, 2022).

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

➢ *Importance of Rice Production*

Rice is an important crop worldwide, providing sustenance to more than half of the world's population, especially in Asia, where it is a staple food. Its importance goes beyond nutrition to encompass important economic, cultural and social aspects. As a staple food crop in many countries, rice plays a fundamental role in food security, especially in developing regions where it is high in calories (IRRI, 2019).

In addition to being an important food source, rice production is also a major driver of rural development. It supports employment, generates income and contributes to economic growth through domestic markets and international trade. The rice industry also plays a key role in providing raw materials for various by-products such as bran oil, animal feed and biogas, which further increase its economic value (FAO, 2020). With the increase in the world population and changing consumption patterns, the demand for rice is expected to increase, making it increasingly important to improve production techniques, yield efficiency and sustainability in rice farming.

Despite its importance, rice production faces many challenges, including climate change, limited water resources, and the need for modern agricultural practices. Therefore, improving rice production through innovative technologies, sustainable agricultural practices, and efficient marketing systems is essential to ensure future food security and economic stability for millions of people worldwide (FAO, 2021).

➢ *Size of Rice Production in Cambodia*

Between 2018 and 2024, Cambodia's rice production showed steady growth in both harvested area and yield per hectare. In 2018, the harvested area was approximately 3.25 million hectares with an average yield of about 3.0 tons per hectare (FAO, 2020). In 2019, the harvested area increased slightly to 3.26 million hectares, maintaining a similar yield per hectare (FAO, 2020). In 2020, the harvested area remained stable at 3.26 million hectares with a slight increase in yield to 3.1 tons per hectare (FAO, 2020). The following years saw an increase in production, with the harvested area increasing to 3.31 million hectares in 2021 and 3.47 million hectares in 2022 with an average yield of 3.2 tons per hectare (FAO, 2021). In 2023, the harvested area reached 3.58 million hectares with a yield of 3.4 tons per hectare (FAO, 2022). The forecast for 2024 estimates a harvested area of 3.64 million hectares with a yield of about 3.3 tons per hectare (FAO, 2023).

Between 2020 and 2023, Cambodia's rice production is projected to increase steadily: 2020/2021: 10.28 million tons, 2021/2022: 10.76 million tons, 2022/2023: 11.48 million tons, 2023/2024: 12.13 million tons (USDA, 2023). Rice production in the world's growing regions includes its origins, history, role in global food security, cropping systems, management practices, production systems, varieties, as well as fertilizer and pest management. As one of the three most important cereal crops that help meet global food demand, rice plays a significant role in the world's current and future food security (Chauhan, 2017).

Rice is the main crop in Cambodia and is grown in many regions of the country. Its cultivation is estimated to employ about 3 million people in the country, with rice production occupying about 75% of Cambodia's agricultural land. The average rice yield in Cambodia is about 3.5 tons per hectare, and by 2022, the total output is estimated at 11.6 million tons of paddy (or unmilled) (EuroCham Cambodia, German Business Cambodia, and GIZ, 2023). Rice is the main agricultural crop and the main food in Cambodia (Kean, 2012).

Rice is an important agricultural product in Cambodia, providing income and food for many people. However, the sector also faces many challenges, such as poor research techniques and limited market access. This article aims to examine the challenges and opportunities in rice cultivation and marketing in Cambodia.

II. CHALLENGES IN RICE CULTIVATION

Rice cultivation in Cambodia faces several challenges:

Table 1. Main challenges in rice cultivation in Cambodia

No.	Challenges	Description	Sources
1	Climate change	Unpredictable weather patterns, including droughts and floods, have severely affected rice yields.	Seng & Craswell, 2019
2	Water management	Inefficient irrigation systems and limited access to water resources hinder consistent rice cultivation.	Seng & Craswell, 2019
3	Soil fertility	Deterioration in soil quality due to overuse and lack of proper management reduces productivity.	Srean & Inthapanya, 2021
4	Pests and diseases	Rice crops are vulnerable to pests and diseases that can destroy yields if not managed effectively.	Kosal & Chhun, 2023

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

5	Access to technology	Limited access to modern agricultural technologies and practices limits farmers' ability to improve efficiency and productivity.	Chhinh & Millington, 2015
6	Financial constraints	Many farmers face financial difficulties, limiting their ability to invest in better inputs, equipment, and technology.	Seng & Craswell, 2019
7	Policies and Regulations	Inconsistent policies and lack of government support can hinder the growth and development of the rice sector.	Olam International, 2017
8	Education and Training	Limited opportunities for agricultural education and training prevent farmers from adopting improved practices and innovations.	Chhinh & Millington, 2015

In addition to the challenges already listed, rice cultivation in Cambodia faces several other major challenges:

Table 2. Additional challenges in rice cultivation in Cambodia

No.	Challenges	Description	Sources
1	Land tenure issues	Unclear land ownership and tenure rights can lead to conflict and hinder long-term investment in land improvement.	Deininger & Feder, 2009
2	Labor shortage	Migration to urban areas and other countries reduces the availability of labor for rice farming.	Wong et al., 2021
3	High input costs	The high cost of inputs such as seeds, fertilizers, and pesticides can reduce profits for farmers.	Seng & Craswell, 2019
4	Post-harvest losses	Poor post-harvest management, storage, and processing can result in significant losses in quality and quantity of rice.	Kosal & Chhun, 2023
5	Research and development	Insufficient investment in agricultural research and development limits the introduction of new, high-yielding, and resilient rice varieties.	Srean & Inthapanya, 2021
6	Extension services	Weak agricultural extension services mean that farmers often lack access to up-to-date information and best practices.	Chhinh & Millington, 2015
7	Cultural traditions	Traditional agricultural practices may not always be compatible with modern and more efficient agricultural methods, limiting productivity gains.	Rambo & Tontisirin, 2009

Rice cultivation in Cambodia faces numerous challenges, including climate change impacts such as erratic rainfall, droughts, and floods, which disrupt water availability and increase the risk of crop failure (Sok et al., 2020; Rao et al., 2018). Soil degradation from excessive fertilizer use and poor farming practices, limited access to modern technology, and rural labor shortages further hinder productivity (Sok et al., 2018; FAO, 2019; Wong et al., 2021). Poor infrastructure, including inadequate roads and storage facilities, raises costs and leads to post-harvest losses (Virak, 2020), while price volatility and exploitation by middlemen reduce farmers' income stability (Chea et al., 2020). Financial constraints limit investments in quality inputs and equipment, and ineffective pest and disease management threatens yields (Phat et al., 2020; Phat et al., 2019). Addressing these issues requires coordinated efforts to improve infrastructure, promote sustainable practices, expand access to technology and credit, and establish supportive policies for market stability and resilience.

Addressing these challenges requires concerted efforts from the government, the private sector, and international organizations to promote sustainable practices, modernize the sector, and improve farmers' livelihoods.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

III. CHALLENGE IN RICE MARKETING

The main problems in the Cambodian rice market, listed in order, are:

Table 3. Main challenges in rice marketing in Cambodia

No.	Challenges	Description	Source
1	Market Access	Limited access to domestic and foreign markets due to poor infrastructure and market connectivity.	Chea et al., 2020
2	Price Volatility	Fluctuations in rice prices create financial instability for farmers.	Phat et al., 2020
3	Exploitation by middlemen	Farmers often sell rice to middlemen at low prices due to lack of market knowledge.	Chea et al., 2020
4	Quality Control Issues	Inconsistent quality and failure to meet international standards reduce competitiveness in the global market.	Virak, 2020
5	Lack of Market Infrastructure	Inadequate storage, processing, and transportation facilities lead to post-harvest losses and low-quality rice.	FAO, 2019
6	Limited Market Information	Farmers lack access to accurate and timely market data for better decision-making.	Sok et al., 2020
7	Weak Cooperatives	Underdeveloped cooperatives limit market access and bargaining power.	Chea et al., 2020
8	Export Barriers	Complicated export procedures, tariffs, and non-tariff barriers restrict international rice trade.	Nguyen et al., 2019
9	Financial constraints	Limited access to credit and financial services hinders investment in better marketing strategies.	Phat et al., 2020
10	Policies and regulations	Inconsistent policies and lack of government support hinder effective rice marketing.	FAO, 2019
11	Branding and promotion	The lack of strong branding and promotion activities can make it difficult for Cambodian rice to compete in the international market.	Nguyen et al., 2019

In addition to the previously mentioned issues in the rice market, other challenges include:

Table 4. Additional challenges in rice marketing in Cambodia

No.	Challenges	Description	Source
1	Limited value-added processing	The lack of milling and processing facilities limits the ability to add value to rice before it reaches the market, reducing potential profits.	FAO, 2019
2	Competition from imported rice	Imported rice often competes with locally produced rice, sometimes at lower prices, which can make it difficult for local producers to compete.	Sok et al., 2020
3	Cultural and consumer preferences	Consumer preferences for certain rice varieties can limit market expansion and require farmers to focus on specialty crops with limited demand.	Chea et al., 2020
4	Corruption and unfair practices	Corruption in the trade and supply chain can lead to unfair practices that affect the transparency and efficiency of the rice market.	Phat et al., 2020
5	Natural disasters	Typhoons, floods, and other natural disasters can disrupt both production and distribution, affecting the market.	Virak, 2020
6	Geographical disparities	Some areas in Cambodia may face greater challenges in accessing markets, especially rural areas with poor infrastructure.	Nguyen et al., 2019

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

The Cambodian rice market faces significant challenges that hinder its efficiency, profitability, and sustainability. Price volatility, driven by weather, harvest yields, and global trends, reduces farmers' income stability and bargaining power (Chea et al., 2020). Poor infrastructure, including inadequate roads, storage, and milling facilities, increases transportation costs and post-harvest losses, limiting access to domestic and international markets (Vireak, 2020). Smallholder farmers struggle with limited market access and are often reliant on middlemen, while competition from neighboring countries like Thailand and Vietnam further restricts Cambodia's global market share (Chea et al., 2020; Rao et al., 2018). The market also lacks value-added products, as limited investment in processing and branding forces reliance on raw rice exports (Heng et al., 2020). Post-harvest losses from poor storage and milling practices further reduce quality and profitability (Nguyen et al., 2019). Weak government policies, insufficient regulations, and limited farmer cooperatives exacerbate these issues, preventing effective market coordination and support (Heng et al., 2019; Hien et al., 2020). Addressing these challenges requires investments in infrastructure, value addition, market access, and supportive policies to enhance the sector's competitiveness and resilience.

IV. OPPORTUNITIES IN RICE CULTIVATION

There are several opportunities in rice cultivation in Cambodia that can drive growth and sustainability:

Table 5. Main opportunities in rice cultivation in Cambodia

No.	Opportunity	Description	Source
1	Adoption of modern agricultural practices	Implementing improved agricultural techniques, such as precision agriculture, better irrigation systems, and modern machinery can increase yields and reduce costs.	FAO, 2019
2	Climate-resilient varieties	Developing and adopting rice varieties that are resilient to the impacts of climate change (e.g., drought- and flood-tolerant varieties) can help maintain stable production.	Sok et al., 2020
3	Improved irrigation systems	Investing in water management and better irrigation infrastructure can reduce water scarcity and increase rice productivity.	Rao et al., 2018
4	Organic and sustainable agriculture	With the growing demand for organic products, the shift to organic rice production can be a lucrative opportunity for Cambodian farmers.	Phat et al., 2020
5	Government support and policies	Strengthening government support through subsidies, incentives, and improved agricultural policies can create a favorable environment for rice production.	Virak, 2020
6	Expanding regional and international trade	Expanding export markets, especially through agreements with ASEAN countries, China, and Europe, can increase demand for Cambodian rice.	Nguyen et al., 2019
7	Collaboration with research institutions	Partnering with research institutions to develop better rice varieties, improve pest management, and increase soil fertility can increase productivity and sustainability.	Phat et al., 2020; FAO, 2019
8	Improved access to finance	Providing farmers with easier access to credit and financing can enable them to invest in better seeds, fertilizers, and equipment.	Sok et al., 2020
9	Strengthening cooperatives	Developing and strengthening farmer cooperatives can improve collective market power, enable farmers to negotiate better prices, and gain access to larger markets.	Chea et al., 2020
10	Infrastructure development	Investing in storage, transportation, and processing infrastructure can help reduce post-harvest losses and improve market access.	Virak, 2020
11	Adoption of digital technologies	The use of mobile applications and digital platforms for market information, weather forecasting, and crop management can help farmers make more informed decisions.	FAO, 2019

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

Addressing the challenges in rice cultivation in Cambodia requires a multi-pronged approach that involves policy changes, technological advancements, infrastructure improvements, and support for farmers. Key solutions may include:

Table 6. Additional opportunities in rice cultivation in Cambodia

No.	Opportunity	Description	Source
1	Soil fertility management	Sustainable agricultural practices such as crop rotation, organic farming, and the use of natural fertilizers can restore soil health and increase long-term productivity.	Hien et al., 2020
2	Strengthening extension services and farmer training	Expanding agricultural education and training programs will help farmers adopt best practices, improve yield quality, and increase their resilience to market and environmental changes.	Phat et al., 2020
3	Improving post-harvest management and storage	Establishing proper storage, processing, and milling facilities will reduce post-harvest losses, ensure better rice quality, and enhance market competitiveness.	Virak, 2020
4	Promoting agri-tourism	Incorporating rice farming into agri-tourism initiatives can attract tourists, boost local economies, and raise awareness of rice production and its cultural importance.	Virak, 2020
5	Improved seed production	Developing and promoting high-yielding, disease- and climate-resistant rice varieties can increase productivity and ensure better harvests.	Rao et al., 2018
6	Contract farming and partnerships	Encouraging contract farming agreements with large rice processors or exporters can help farmers access stable markets, higher prices, and access to quality inputs.	Phat et al., 2020
7	Private sector collaboration	Partnerships with private companies involved in rice milling, distribution, and marketing can increase efficiency and streamline the supply chain, leading to better incomes for producers.	Nguyen et al., 2019
8	Development of rice-based products for animal feed	Using rice byproducts (such as broken rice) for animal feed production has the potential to reduce waste and tap into the growing market for animal feed.	Sok et al., 2020
9	Renewable energy in rice mills	Implementing solar or other renewable energy sources in rice mills and other processing units can reduce energy costs and make operations more sustainable.	FAO, 2019
10	Carbon credits and eco-friendly certification	Rice farmers can participate in carbon credit schemes or obtain eco-friendly certification, which can open up premium markets and increase income.	Virak, 2020
11	Public-private partnerships (PPPs)	Creating partnerships between governments, the private sector, and NGOs to improve infrastructure, market access, and agricultural training can create more efficient rice production systems.	Phat et al., 2020

Rice cultivation in Cambodia presents numerous opportunities for growth and development, leveraging its natural resources, diverse rice varieties, and strategic location in the Mekong River Basin. The country's unique rice varieties, such as "Phka Malis," offer opportunities to differentiate Cambodian rice in global markets and attract premium prices (Sok et al., 2020). Developing climate-resilient rice varieties and promoting sustainable agricultural practices can mitigate the impacts of climate change and ensure robust yields (Sok et al., 2020). Mechanization and modern agricultural technologies, such as precision farming and improved milling equipment, can enhance productivity and reduce post-harvest losses (Nguyen et al., 2019). Expanding irrigation infrastructure can stabilize yields and reduce reliance on rain-fed agriculture, while adopting organic farming practices can position Cambodia as a supplier for niche organic markets (Heng et al., 2020). Government support through subsidies, rural infrastructure development, and agricultural research initiatives is crucial to enabling growth (Heng et al., 2019). Integrating rice production with agritourism offers diversification of farmer incomes and increased global awareness of Cambodian rice, while collaboration with international organizations can bring funding, expertise, and market access (Hien et al., 2020; Rao et al., 2018). These opportunities, if effectively leveraged, can boost food security, increase farmer incomes, and enhance Cambodia's competitiveness in the global rice market.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

V. OPPORTUNITIES IN RICE MARKETING

The main opportunities in rice marketing in Cambodia, listed in order, are:

Table 7. Main opportunities in rice marketing in Cambodia

No.	Opportunity	Description	Source
1	Expanding exports	Expanding access to international markets, especially ASEAN, China, and Europe, can increase demand for Cambodian rice.	Chea et al., 2020
2	Value-added products	Developing rice-based products such as rice flour, noodles, brown rice, and rice cakes can open up new markets and increase the price per ton of rice produced.	Heng et al., 2020
3	Organic rice production	The global increase in demand for organic food creates opportunities for Cambodian farmers to produce and market organic rice, attracting premium prices.	Sok et al., 2020
4	Labeling and certification	Creating a strong brand identity for Cambodian rice, especially through certifications such as Geographic Indication (GI) or organic certification, can enhance its reputation and value in international markets.	Hien et al., 2020
5	Digital marketing and e-commerce	Using digital platforms to reach consumers directly and sell rice products online can increase market access.	Virak, 2020
6	Cooperative and farmer group marketing	Strengthening cooperatives and farmer groups can help increase bargaining power, reduce costs, and improve market access by pooling resources and common markets.	Rao et al., 2018
7	Rice product utilization	Promoting the use of rice products such as bran for animal feed or husks for bioenergy can create additional revenue streams and reduce waste.	Heng et al., 2021
8	Niche segmentation	Targeting specific consumers, such as health-conscious consumers or high-value rice consumers, can help enter profitable markets for specialty rice products.	Chea et al., 2021
9	Strategic partnerships	Collaboration with international rice traders, processors, or exporters can provide access to new markets, technologies, and marketing channels.	Sok et al., 2021

In addition to the key opportunities already identified, other potential opportunities in the Cambodian rice market include:

Table 8. Additional opportunities in rice marketing in Cambodia

No.	Opportunity	Description	Source
1	Agrotourism integration	Creating agrotourism initiatives around farming can attract tourists, raise awareness of Cambodian rice, and promote direct sales of rice products through tourist shops.	Chea et al., 2020
2	Rice packaging innovation	Introducing attractive and sustainable packaging for rice products, such as eco-friendly or branded packaging, can increase the attractiveness of the product and the market in both domestic and international markets.	Heng et al., 2020
3	Rice seed industry development	Establishing a robust rice seed industry for certified high-quality seeds can help boost rice yields and provide another product for export.	Sok et al., 2020
4	Sustainable and environmentally friendly practices	Promoting environmentally friendly rice production methods, such as minimal use of chemicals and adoption of integrated pest management (IPM), can	Hien et al., 2020

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

		appeal to consumers worldwide who are concerned about sustainability.	
5	Corporate Social Responsibility (CSR) partnerships	Partnering with corporations for CSR initiatives focused on sustainable farming or rural development can provide financial and technical support, improving rice market opportunities.	Nguyen et al., 2019
6	Promoting local rice consumption	Increasing the consumption of locally produced rice through marketing campaigns, awareness programs, and restaurant partnerships can stimulate local demand.	Rao et al., 2018
7	Regional trade agreements	Using regional trade agreements, such as the ASEAN Economic Community (AEC), can ease trade barriers and improve access to neighboring countries for rice imports and exports.	Heng et al., 2019
8	Diversification into specialty rice varieties	Focusing on specialty rice varieties, such as fragrant rice or non-glutinous rice, can attract niche markets with higher value offerings.	Chea et al., 2021

The Cambodian rice market offers numerous opportunities to enhance competitiveness, boost farmer incomes, and support economic growth. Expanding exports to high-value markets, such as the EU and the U.S., can increase global market share, particularly for specialty varieties like fragrant rice (Chea et al., 2020). Developing value-added products, such as rice flour and noodles, can diversify income sources and reduce reliance on raw rice exports (Heng et al., 2020). Organic rice production presents a premium market opportunity, leveraging Cambodia's naturally low-chemical farming practices (Sok et al., 2020). Strengthening farmer cooperatives can improve bargaining power, access to credit, and collective processing capabilities (Hien et al., 2020). Investments in post-harvest management, including modern storage and milling facilities, can reduce losses and improve export quality (Nguyen et al., 2019). Branding Cambodian rice with unique qualities, such as aromatic varieties and sustainability, can enhance global recognition (Rao et al., 2018). Government policies supporting infrastructure, technology adoption, and international market access are essential (Heng et al., 2019). Additionally, digital technologies and e-commerce platforms can revolutionize the rice market by improving market access and enabling direct sales (Virak, 2020).

VI. CONCLUSION

In conclusion, Cambodia's rice sector is a cornerstone of its agricultural economy, facing a blend of significant challenges and promising opportunities. Issues such as climate change, land degradation, labor shortages, poor infrastructure, financial constraints, and market inefficiencies hinder the sector's growth and profitability. Additionally, post-harvest losses, limited access to value-added processing, and competition from neighboring countries exacerbate these challenges. However, Cambodia has substantial potential to strengthen its rice cultivation and marketing systems. Opportunities lie in diversifying rice varieties, adopting climate-resilient farming methods, embracing mechanization, and expanding organic rice production. Enhancing market access through improved infrastructure, branding, and digital technologies, as well as developing farmer cooperatives and reducing post-harvest losses, can boost the sector's competitiveness. Government support, international cooperation, and investments in policy development, infrastructure, and sustainable practices will be essential for unlocking the sector's full potential. By addressing these challenges and capitalizing on its opportunities, Cambodia can increase its rice yields, improve farmer livelihoods, and secure a stronger position in the global rice market. The best options for achieving long-term market stability in Cambodia's rice sector include: Strengthening market infrastructure and resource access: Investing in better infrastructure and ensuring farmers have access to essential resources fosters improved productivity, efficiency, and stability, Enhancing supply chains and price stabilization mechanisms: Developing robust supply chains and mechanisms for fair pricing ensures farmers can bring their rice to market efficiently and profitably, Facilitating access to financial services and market information: Building modern farming communities with access to financial tools and real-time market data empowers farmers to make informed decisions and invest wisely, supporting long-term stability and growth.

ACKNOWLEDGMENT

This study was financially supported by Research Team of University of Kratie. The authors would like to express their sincere gratitude to the editors and expert reviewers of the International Journal of Innovative Science and Research Technology for their valuable feedback and suggestions to improve this manuscript. All data and opinions presented in this article are solely the responsibility of the authors and do not necessarily reflect the views or policies of any affiliated organization.

REFERENCES

[1]. Asian Development Bank (ADB). (2021). *Cambodia agriculture and rural development: Challenges and opportunities.* ADB Publications. https://www.adb.org/countries/cambodia/agriculture
[2]. Brown, C., et al. (2019). Water management in rice production. *Irrigation Science, 25*(2), 150–165.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

[3]. Chauhan, B. S. (2017). *Rice production in the world's growing regions: Origins, history, and role in global food security*. In A. S. R. Anwar (Ed.), *Global food security and the role of rice* (pp. 1-20). Springer.
[4]. Chea, K., & Heng, S. (2020). Price volatility and market access issues for Cambodian rice farmers. *Agricultural Economics, 51*(5), 451–460.
[5]. Deininger, K., & Feder, G. (2009). Land registration, governance, and development: Evidence and implications for developing countries. *World Bank Research Observer, 24*(2), 233-266.
[6]. EuroCham Cambodia, German Business Cambodia, & GIZ. (2023). *Product & supplier brochure rice.* Supported by the Ministry of Commerce Cambodia.
[7]. FAO (2020, 2021, 2022, 2023). Cambodia rice production statistics. Retrieved from: https://www.fao.org/faostat/en/#country/121
[8]. Food and Agriculture Organization (FAO). (2019). *The state of food and agriculture: Moving forward with smart agriculture*. Food and Agriculture Organization of the United Nations.
[9]. Food and Agriculture Organization (FAO). (2020). *FAOSTAT: Rice production in Cambodia.* http://www.fao.org/faostat/en/#data
[10]. Food and Agriculture Organization (FAO). (2020). *FAOSTAT: Rice production in Cambodia.* http://www.fao.org/faostat/en/#data
[11]. Food and Agriculture Organization (FAO). (2020). *Rice: A key to food security and sustainable development.* http://www.fao.org/rice/en/
[12]. Food and Agriculture Organization (FAO). (2021). *Agricultural outlook: Rice in Cambodia.* http://www.fao.org/rice-production-cambodia
[13]. Food and Agriculture Organization (FAO). (2021). *The importance of rice production for global food security.* http://www.fao.org/rice/importance
[14]. Food and Agriculture Organization (FAO). (2022). *Rice market trends in Southeast Asia: Cambodia overview.* http://www.fao.org/rice-market/cambodia
[15]. Food and Agriculture Organization (FAO). (2023). *Projections for rice production and trade in Cambodia.* https://www.fao.org/cambodia/rice
[16]. Heng, S., & Nguon, T. (2020). Value-added rice products: Opportunities for growth in Cambodia's rice sector. *Journal of Agribusiness, 19*(2), 112–121.
[17]. Heng, S., & Tan, A. (2019). The role of government policies in Cambodia's rice marketing and export. *Journal of Agricultural Policy, 28*(1), 33–45.
[18]. Heng, S., & Tan, A. (2020). The role of irrigation in enhancing rice production in Cambodia. *Journal of Agricultural Policy, 28*(3), 49–59.
[19]. Hien, L. X., & Nguyen, K. H. (2020). Sustainable rice farming practices in Southeast Asia: A case study of Cambodia. *Agronomy, 10*(4), 546. https://doi.org/10.3390/agronomy10040546
[20]. Hien, L. X., & Nguyen, K. H. (2020). The role of agri-tourism in rural development: A case study from Cambodia. *Agricultural Economics Review, 49*(2), 203–216.
[21]. International Rice Research Institute (IRRI). (2019). *The importance of rice in global food security.* https://www.irri.org/rice-food-security
[22]. Kean, S. (2012). The rice situation in Cambodia. *Support for the Association of Southeast Asian Nations Plus Three Integrated Food Security Framework.*
[23]. Nguyen, A., et al. (2020). Challenges in rice production. *Journal of Agricultural Studies, 20*(3), 201–220.
[24]. Nguyen, T., & Phan, Q. (2019). Mechanization in rice farming: Adoption challenges in Cambodia. *Rice Research Journal, 7*(2), 44–52.
[25]. Nguyen, T., et al. (2024). Sustainable practices in rice farming. *Environmental Sustainability Journal, 21*(3), 199–215.
[26]. Olam International. (2017). *Rice Sector Development: Challenges and Opportunities*. Olam International.
[27]. Organization for Economic Co-operation and Development (OECD). (2022). *Cambodia's rice value chain: Challenges and opportunities in the global market.* OECD Publishing. https://www.oecd.org/cambodia/rice-value-chain
[28]. Peng, S., Tang, Q., & Zou, Y. (2009). Current status and challenges of rice production in China. *Plant Production Science, 12*(1), 3–8. https://doi.org/10.1626/pps.12.3
[29]. Phat, S., & Nou, T. (2019). Pest and disease management in Cambodian rice farming: Challenges and solutions. *International Journal of Pest Management, 65*(3), 243–253.
[30]. Phat, S., & Peng, C. L. (2020). Financial challenges and opportunities for rice farmers in Cambodia. *Journal of Agricultural Finance, 10*(2), 98–105.
[31]. Rambo, A. T., & Tontisirin, K. (2009). *Agricultural systems and food security in Cambodia: Challenges and opportunities*. Food and Agriculture Organization of the United Nations (FAO).
[32]. Rao, V. R., & Babu, R. (2018). Rice cultivation in the Mekong Basin: A response to climate change. *Environmental Science and Policy, 89*, 156–162.
[33]. Sok, B., et al. (2021). Logistics and storage in rice marketing. *International Journal of Food Science, 15*(4), 312–330.
[34]. Sok, S., Chhinh, N., Hor, S., & Nguonphan, P. (2021). Climate change impacts on rice cultivation: A comparative study of the Tonle Sap and Mekong River. *Sustainability, 13*(16), 8979. https://doi.org/10.3390/su13168979
[35]. Sok, S., Mahalingam, S. K., & Seneviratne, S. I. (2020). Climate change and its impact on rice production in Cambodia. *Agricultural Systems, 185*, 102946. https://doi.org/10.1016/j.agsy.2020.102946
[36]. Sok, S., Seng, K., & Khem, S. (2018). The impact of soil degradation on rice production in Cambodia: Challenges and solutions. *Soil and Tillage Research, 181*, 1–7. https://doi.org/10.1016/j.still.2018.03.005
[37]. Tran, Q., et al. (2019). Climate change and rice production. *Climate Impact Research Journal, 22*(3), 145–160.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14862890

[38]. U.S. Department of Agriculture (USDA). (2023). *Cambodia rice production.* https://ipad.fas.usda.gov/countrysummary/Default.aspx?crop=Rice&id=CB
[39]. Vireak, M. (2020). Digital transformation in agriculture: Opportunities for Cambodian rice marketing. *International Journal of Rural Development, 13*(1), 120–130.
[40]. Vireak, M. (2020). Infrastructure development and its impact on rice marketing in Cambodia. *International Journal of Rural Development, 12*(3), 213–230.
[41]. Wong, H. M., & Tan, S. S. (2021). Labor migration and its impact on agricultural productivity: Evidence from Cambodia's rice sector. *Asian Development Review, 38*(1), 53–72.