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Investigating the Comparative Advantage of Saffron Production and Export in Afghanistan

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ABSTRACT: Afghanistan's agriculture sector benefits from its available resources and potential in various agricultural fields, particularly in the cultivation of saffron, especially in Herat province. The present study examines the relative advantage of saffron production in Herat province, utilizing data collected from farmers and experts of the saffron industry for the agricultural year 1400-1401. Additionally, the International Trade Center statistics are employed to assess the relative advantage of Afghanistan's saffron exports for the years 2013-2022 using the Political Analysis Matrix (PAM). The results indicate that the government and the global community provide effective support for saffron production and exports, assisting producers of this commodity through indirect subsidies. Moreover, the examination of the relative advantage and competitiveness of saffron reveals that focusing on this crop as an alternative cultivation (poppy) in Herat, Afghanistan justifies its production. Therefore, in order to improve the current situation and preserve this important commodity, it is essential to adopt appropriate supportive policies to promote saffron production and exports, enhance performance, reduce production costs, and focus on product marketing, as well as provide necessary facilities, including essential financial support.

Keywords: Saffron, Political Analysis Matrix, relative competitive advantage, supportive policies, Herat-Afghanistan.

INTRODUCTION

Agriculture is one of the most critical sectors of Afghanistan's economy. It is directly linked to human nutrition and pursues various macro-level objectives, including achieving self-sufficiency, ensuring food security, and maximizing social welfare, which are significant from the perspective of policymakers (Abedi et al,2008). The quantitative and qualitative development of agricultural products based on the capacities and capabilities of different regions of a country will lead to dynamic growth and development of the national economy. Undoubtedly, achieving this goal is not feasible without identifying the regional drivers of agricultural growth (Ansari and Salami, 2016).

On the other hand, support for the agricultural sector is provided for various reasons. These reasons include job creation, development of production in related industries, ensuring food security, the significance of certain produced goods, rural development, prevention of migration, environmental protection, national security, and independence, as well as creating added value and increasing national and foreign income. Additionally, it encompasses economic justification and improvement of production structures, self-sufficiency, and enhancement of farmers' income and welfare, ultimately reducing poverty in countries (Barry, 1992). In a world of free trade, attention and support for the agricultural sector against international competitors is one of the crucial responsibilities of governments (Mohammadian *et al.,* 2019). In today's fiercely competitive economic landscape, every country needs to develop economic programs to maintain its political and economic independence. The principle of comparative advantage serves as one of the essential tools in financial policymaking, promoting the development of relative advantages in various economic sectors. This not only leads to optimal resource allocation across different sectors but also

improves production patterns and can determine the type and composition of exports.

In recent years, the importance of adhering to the principle of comparative advantage has doubled due to the country's inclination toward trade liberalization and membership in the World Trade Organization (WTO). With accession to the WTO, countries are required to implement a scheduled plan for reducing and eliminating non-tariff barriers and subsidies. This issue is particularly crucial in the agricultural sector due to the strategic importance of food supply from political and economic perspectives (Yazdani *et al.,* 2006). Support policies are among the most significant economic strategies in agriculture, aimed at enhancing competitiveness in export markets and improving farmers' income. This is particularly necessary due to the low elasticity of agricultural product supply, perishability, and limited storage capacity (Hosseini *et al.,* 2009).

Overall, considering the challenges in securing inputs and production factors in agriculture, as well as the distinct climatic and geographical characteristics of different regions, advancing based on the principle of comparative advantage is of paramount importance. By applying this principle, it is possible to determine regional cropping patterns and optimally allocate resources among various activities, thereby identifying production and export capabilities and facilitating effective investments (Mirlotfi *et al.,* 2013).

Identifying the relative advantages of each region not only leads to better utilization of existing resources but also accelerates regional development (Hatef *et al.,* 2016). Awareness of these advantages at both national and regional levels serves as a foundation for understanding true advantages at the national level and provides a solid basis for global planning (Rahmani and Moalemi 2010).

Currently, Afghanistan's agricultural infrastructure remains underdeveloped due to years of war, insecurity, and the absence of structured and coherent planning. Agricultural production occurs with high and unsuitable costs, highlighting the urgent need for planned cultivation and practical guidelines for producing agricultural products based on their relative and economic advantages in various regions of the country (Nikzad, 2012). Furthermore, agricultural policymaking in Afghanistan lacks a structured and targeted approach, primarily relying on international support and fragmented temporary projects. This issue is the primary reason for the failure to achieve set goals in this sector, necessitating a review of implemented policies to foster improvements (Tavakoli *et al.,* 2020).

Therefore, examining the comparative advantage of saffron production and export at the regional level can be instrumental in formulating development strategies for Afghanistan's agricultural sector. Another concern is the sustainability of agriculture in Afghanistan, which aims to be efficient, economic, and profitable while maintaining environmental health and natural resources, thus ensuring food security (Mohammadi *et al*., 2014).

The theoretical concept of comparative advantage in international economics, based on the theories of Adam Smith and David Ricardo, emphasizes the relative differences in production costs and advantages between countries. This concept significantly influences the direction of international trade. According to this theory, under assumptions such as the free flow of resources and products, comparative advantage is applicable not only between countries but also among regions within a country. In this context, their capabilities, natural resources, and other assets determine comparative advantage among regions. The principle of comparative advantage in national economics states that each region tends to produce products for which it has a greater relative advantage (lower production costs or competitive ability compared to products from other regions) (Zhong Li *et al.,* 2004).

Numerous studies have been conducted on comparative advantage in various parts of the world and in Afghanistan. In foreign studies, Shahabuddin and Dorosh (2002); Warr (2002); Page (2002); Lagos and Mardones (2003); Huang *et al*. (2003); Fung (2004); Wurtenberger *et al*. (2006); Saban *et al*. (2007); Ayoola and Makinde (2007) examined the comparative advantage of certain industrial and agricultural products in different countries. Additionally, Serin and Civan (2008) demonstrated in their study that Turkey has a significant comparative advantage in the export of fruit juices and olive oil, while it does not have such an advantage for tomatoes. In another study in Iran, Aziz and Yazdani (2006) analyzed the export market of Iranian apples, emphasizing the principle of comparative advantage. Their findings indicated that Iranian apples possess a comparative advantage for export, although their competitive power showed irregular and declining fluctuations. Shahnooshi *et al*. (2017) examined the comparative advantage of grains and legumes in Khorasan province, finding that rainfed wheat, irrigated barley, paddy, irrigated wheat, rainfed lentils, and rainfed chickpeas ranked first to sixth.

Souza *et al*. (2017) evaluated the economic performance of rice production chains in Brazil and Uruguay using a policy analysis matrix. Their analysis of data collected during 2011-2012 indicated that the studied chains in both countries have comparative advantages under current market conditions, although these competitive and relative advantages are not due to government support policies, as production systems in both countries have paid significant taxes.

Abbas and Wahid (2017) assessed the trade competitiveness of Pakistan using the revealed comparative advantage index (Balassa). Their analysis of data related to 14 major agricultural and industrial activities from 2003 to 2014 revealed that Pakistan has a higher comparative advantage for cotton, grains, raw leather, and fruits, while lacking such an advantage for dairy products. Furthermore, results from the panel data model indicated that economic growth and the real exchange rate positively impact the competitive advantage of the activities examined.

Kim and Thunt (2017) employed the revealed comparative advantage index to analyze Myanmar's export competitiveness. Their findings for the years 2010-2015 showed that a significant portion of Myanmar's exports consists of primary and raw products, with higher revealed comparative advantage

indices for these exported commodities. Additionally, in key sectors such as agriculture, natural resources, fishing, and livestock, the revealed comparative advantage index exhibited a downward trend during the study period.

Ceylan *et al.* (2018) evaluated Turkey's comparative advantage in the export of grapes and cherries during the period 2008-2016. By calculating the revealed comparative advantage index, they determined that Turkey has a comparative advantage in the global markets for grapes and cherries, indicating a need to increase the share of these products in Turkey's fruit exports.

Firlej and Kubala (2018) examined the export potential of agricultural products and food in the Visegrád Group countries (Czech Republic, Hungary, Poland, and Slovakia) from 2005-2017. Their study, using the revealed comparative advantage index, found that agricultural and food exports in these countries are vulnerable to economic trends. Furthermore, the comparative advantage of food products of animal origin in this group of countries was found to be significant.

Maryam *et al.* (2018) investigated the trade comparative advantage among BRICS member countries (Brazil, Russia, India, China, and South Africa). Considering trade intensity and the revealed comparative advantage index during 2001-2015, their findings indicated that Brazil and Russia possess comparative advantages in natural resources, while India and China do so in processed and industrial products.

Haryanto et al. (2018) conducted a study to measure the competitiveness of corn farms in Indonesia using a policy analysis matrix. They collected data from 102 farmers in 2018. The calculated internal resource cost index indicated that corn cultivated in the rainy season has a higher comparative advantage. According to the study's findings, government support for the produced crop is minimal, while significant support is provided for both commercial and non-commercial agricultural inputs.

Benalywa *et al.* (2019) analyzed the comparative advantage of broiler chicken production in Malaysia. Their study employed a policy analysis matrix, the internal resource cost index, and data from 310 production enterprises during the period of 2015-2016. The results indicated that Malaysia has a comparative advantage in all scales of broiler chicken production. Sensitivity analysis further revealed that changes in production input prices significantly impact comparative advantage.

Jagdambe (2019) examined the competitiveness of Indian agricultural products in global markets using a consistency test. This study utilized the revealed comparative advantage index and data from 1996 to 2015. Based on the findings, the revealed comparative advantage indices were stable throughout the study period. Recommendations for enhancing the competitive advantage of the Indian agricultural sector included improvements in infrastructure, labeling, packaging, quality enhancement, storage, and marketing.

Saad *et al.* (2019) investigated the comparative advantage of wheat production in China. Utilizing a policy analysis matrix and data obtained from income-cost questionnaires in 2018, they found that there is government support for wheat production. Under the current policies, farmers receive prices higher than global market prices. The results also indicated the absence of comparative advantage in wheat production.

Ceylan (2019) explored the comparative advantage of wheat in Turkey and Hungary. Using the revealed comparative advantage index over a decade (2009-2018), he concluded that Hungary exhibits a higher degree of specialization compared to Turkey. The study identified several influencing factors on comparative advantage, including natural resources, agricultural productivity, economic sector structures, and ultimately, government policies, supports, and interventions.

Elsamie *et al.* (2020) examined the impact of agricultural policies on cotton production in Egypt using a policy analysis matrix. The results indicated that during the study period (2000-2017), Egypt possessed a comparative advantage in cotton production, making domestic cotton production preferable to imports.

Pilusa *et al.* (2020) investigated the competitive advantage of chicken meat in South Africa. Their study used a policy analysis matrix and comparative advantage indices to calculate economic and financial profitability. The results indicate that the internal resource cost index supports the competitive position of chicken meat in the South African market.

The internal resource cost index for 2017 supports the notion that South Africa possesses a comparative advantage in chicken meat production, with government policies having a positive impact on this sector.

Abdurofi and Ismail (2021) evaluated the competitiveness, comparative advantage, and government support for honeybee farming in Malaysia using a policy analysis matrix. According to their findings, the industry demonstrates a high level of competitiveness in both domestic and international markets, indicating a competitive advantage in honeybee farming in Malaysia, where government support is deemed essential.

Ashrafi *et al.* (2017) examined the comparative advantage of raisin production for Khorasan Razavi province and the export advantage of this product for Iran. Their study utilized a policy analysis matrix along with the revealed comparative advantage index and the symmetric revealed comparative advantage index for the period from 1961 to 2001. The research findings indicated that Khorasan province has a comparative advantage in raisin production, while Iran has a comparative advantage in the export of this product.

In the context of domestic studies, Nikzad *et al.* (2021) conducted research on the comparative advantages, competitiveness, and effects of national and international support policies for selected agricultural-economic zones, including irrigated and rainfed wheat, corn, rice, cotton, potatoes, saffron, and opium. Their results indicated that despite support for farmers in

tradable inputs, the production system is non-protective and accompanied by tax imposition.

The findings from these studies underscore the increasing importance of examining differences in regional advantages across various sectors of a country. A review of the existing literature reveals that only one study has been conducted in Afghanistan regarding the evaluation and analysis of comparative advantages, competitiveness, and the effects of supportive policies for selected agricultural-economic products. Consequently, this study aims to fill the research gap identified in the previous work with a quantitative approach, thereby enhancing the importance of the topic at both national and international levels.

Given the aforementioned context, the present study is applied in nature, as it aims to utilize the findings to address existing issues. The thematic scope of the research focuses on examining the comparative advantage of saffron production and export in Afghanistan. Geographically, the study will concentrate on Herat province, as it accounts for a significant portion of saffron production and supply in Afghanistan due to its unique climatic conditions and agricultural structure. In fact, saffron producers in Herat province represent the statistical population of this research.

To analyze the comparative advantage of saffron production, data from the 2021-2022 period will be utilized, while data from the past decade will be employed for assessing the comparative advantage of saffron exports. Therefore, the sources of information will include questionnaires, interviews with experts, and statistical databases (such as the International Trade Centre). This research will systematically examine each of the objectives related to the comparative advantage of saffron production in Herat and its exports relative to other countries worldwide.

MATERIAL AND METHODS

In this study, the policy analysis matrix (PAM) is used. This method is considered one of the most comprehensive and practical methods of policy analysis and calculation of relative advantage, which enables the researcher to analyze the policy along with calculating the values of the indicators and provide solutions to modify the policies in order to achieve the goals. This matrix provides three important analytical tools: 1. Measuring the efficiency of input consumption in the production process by comparing market and social profitability, 2. Measuring relative advantage and competitiveness, 3. The degree of government involvement in production. In this matrix, all the producer's incomes and expenses are expressed in the form of a 4x3 matrix. In fact, policy analysis matrix is an accounting method based on which the budgeting information of on- and off-farm activities can be presented. Monke proposed the general framework of the policy analysis matrix and Pearson in 1989, Master, and Nielson completed it in 1995.

Table 1: Policy analysis matrix framework.

Calculated based	Income	Cost		Benefit
		External Inputs	Internal Inputs	
According to private price	A	B	C	D
According to social price	E	F	G	H
Difference	I	J	K	L

Internal inputs (according to private price), Exchange inputs (according to private price); Income (according to private price); Benefit (according to social price); Internal inputs (according to social price); Exchange inputs (according to social price); Income (according to social price); Benefit (difference); Internal inputs (difference); Exchange inputs (difference); Income (difference)
Source: Fathi *et al*. (2015)

The first row of the policy analysis matrix (PAM) includes income (A), costs related to commercial (B) and non-commercial inputs (C) and internal profitability (D). Considering the production technology and domestic prices of products and inputs (including government policies), the domestic profit can be calculated. In the second line of the policy analysis matrix, calculations are done based on shadow prices, so the resulting profit (H) represents the social profit. The third row of the policy analysis matrix is obtained from the difference of the elements of the first and second corresponding matrices and provides the possibility of policy analysis (Jalilpiran and Naseri Askui 2015).

Market Prices (Private): Market prices are the prices at which goods and services are actually exchanged and are used for budgeting purposes. These prices are determined in the domestic market and are influenced by government policies, interventions, and market inefficiencies (Aghaei & Razaghalizadeh 2011).

Shadow Prices (Social): Shadow prices are derived from private prices by eliminating policy distortions such as subsidies and taxes, or market failures like monopolies. These prices are used in economic analyses aimed at maximizing national income. In this context, market profit reflects the competitiveness of the agricultural system under specific technological conditions, policies, and government interventions, while social profit indicates the comparative advantage or efficiency of the agricultural system. Social profit is recognized as an efficiency indicator, as inputs and outputs are calculated based on their scarcity or opportunity costs (Aghaei & Razaghalizadeh, 2011).

Indicators of Comparative Advantage, Competitive Ability, and Support Coefficient Based on the PAM Matrix:

The internal resource cost index within the framework of the Policy Analysis Matrix (PAM) is derived from the analysis of factor productivity returns based on

foreign currency. In other words, the internal resource cost index represents the opportunity cost of domestic resources in terms of global prices that are expended on the production of a product (Fathi *et al.,* 2015).

$$DRC = \frac{G}{E - F}$$

In the above relation, G represents the costs of non-tradable inputs at shadow prices, E represents revenue based on shadow prices, and F represents the costs of tradable inputs at shadow prices. The production of a product is considered advantageous when the internal resource cost is less than one.

The Social Cost-Benefit (SCB) ratio is derived from the relationship between shadow costs and shadow income.

$$SCB = \frac{F + G}{E}$$

In the above relation, F represents the costs of tradable inputs at shadow prices, G represents the costs of non-tradable inputs at shadow prices, and E represents income based on shadow prices. Values between zero and one for this index indicate the advantage and profitability of producing and exporting the product in question, while values greater than one indicate a lack of comparative advantage in production and export (Fathi *et al*., 2015).

The Net Social Profit (NSP) index calculates the profit generated from production by considering the shadow prices of both domestic and foreign production inputs, as well as the product in question.

NSP=E-F-G

If the Net Social Profit (NSP) is greater than zero, it indicates that there is a comparative advantage in the production of the product. Conversely, if NSP is less than or equal to zero, the production activity lacks social profitability and comparative advantage. The shadow exchange rate is particularly sensitive in calculating comparative advantage and determining government support rates. In fact, this rate serves as the basis for deriving an acceptable shadow price for tradable products and inputs (Fathi *et al.,* 2015).

The Nominal Protection Coefficient for Inputs (NPCI) is utilized to assess the level of support for tradable inputs in the production process. The NPCI value is obtained by dividing the cost of tradable inputs at market prices by the cost of tradable inputs at shadow prices.

$$NPCI = \frac{B}{F}$$

If the resulting index is less than one, it can be argued that the producer receives indirect subsidies for using tradable inputs. If the value is greater than one, it indicates that the producer effectively pays indirect taxes when consuming these inputs. According to the elements of the Policy Analysis Matrix, the following formula is used to calculate the Nominal Protection Coefficient for Inputs (Fathi *et al.,* 2015).

The Nominal Protection Coefficient for Outputs (NPCO) is derived from the ratio of market income to shadow income. If the value is greater than one, it can be argued that the producer receives indirect subsidies, indicating market support for the product. Conversely, a value less than one signifies the imposition of indirect taxes on the producer and a lack of market support for the product. Therefore, the formula for the Nominal Protection Coefficient for Outputs can be defined as follows (Fathi *et al.,* 2015).

$$NPCO = \frac{A}{E}$$

The Effective Protection Coefficient (EPC) is calculated as the ratio of the value-added production based on market prices to the value-added production based on shadow prices.

$$EPC = \frac{A - B}{E - F}$$

If the EPC is less than one, it can be argued that the overall effects of government intervention in the input and product markets are detrimental to the producer. Conversely, a value greater than one indicates that the total effects of government intervention in the product and input markets are beneficial to the producer. According to the framework of the Policy Analysis Matrix, the formula for the Effective Protection Coefficient is as follows (Fathi *et al.*, 2015).

The Domestic Competitiveness Index (UC_d) indicates whether a producer can compete in domestic markets despite distortions in the prices of products and production inputs. The formula for calculating this index is as follows:

$$UC_d = \frac{B + C}{A}$$

In the above formula, if the calculated value is less than (greater than) one, it indicates that the producer has (lacks) domestic cost competitiveness in the production of the product (Fathi *et al.,* 2015).

The Export Competitiveness Index (UCX) determines whether the product produced under current conditions and with inputs at domestic prices (which may include subsidies and indirect taxes) can compete in global markets. The calculation of this index is as follows:

$$UCx = \frac{B + C}{E}$$

If the above index is less than (greater than) one, it indicates that the producer has (lacks) cost competitiveness in exporting the product. If the value is equal to one, the producer is at breakeven in global markets (Fathi *et al.,* 2015).

Shadow Prices: One of the most critical components of the Policy Analysis Matrix (PAM) is determining the shadow prices for production inputs and the opportunity costs associated with production, achieved through adjustments and corrections to nominal (market) prices(Gardner et al., 1998).

Tradable Inputs: Tradable inputs refer to resources and production factors that are exchanged widely in global markets. The shadow price of tradable inputs, such as pesticides, fertilizers, and seeds, is calculated as their CIF price at the border, plus the transportation costs from entry points to their destinations (Hosseini *et al.,* 2009).

It is noted that for calculating the shadow prices of chemical fertilizers and pesticides, the average import prices are utilized. Subsequently, the shadow value is adjusted based on the conversion factor (the ratio of shadow prices to market prices) according to their consumption per unit in the calculations. The shadow price of machinery is assumed equal to the average rental cost for one hectare of crop.

Non-Tradable Inputs: Non-tradable inputs used in the production of products include those that cannot be bought or sold in international markets. Various methods exist to determine the shadow prices of such inputs, including land, water, labor, and capital. The most common approach is estimating the opportunity cost of not utilizing these factors in their best alternative use (Julaye and Jairan 2008).

Shadow Income: To obtain the shadow income of saffron, given that this product has a share in the global export market, its shadow price is considered equivalent to the final export price of saffron. Therefore, the pricing basis is the FOB (Free on Board) price, which, when multiplied by the shadow exchange rate, yields the Afghan currency equivalent. This value is then multiplied by the product yield to derive the shadow income(Gardner et al., 1998).

Shadow Exchange Rate: Various methods exist for calculating the shadow exchange rate, which is used to estimate the real value of currency. A relatively simple and common approach is to use the theory of Purchasing Power Parity (PPP). In this theory, the price of tradable goods or the general price level between two countries determines the equilibrium exchange rate. In this study, the relative Purchasing Power Parity method was employed to calculate the shadow exchange rate (Gardner et al., 1998).

$$E = \frac{PI}{PI*} \times E$$

Where PI is the wholesale price index abroad, taken as the index value for the year under study. Additionally, PI∗ is the domestic retail price index, considered a representative of the general price level in the country. Finally, E is the free exchange rate in the base year.

To evaluate export competitiveness, various indices have been proposed by researchers. However, the revealed comparative advantage (RCA) index is the most commonly used in empirical studies, and its relationship can be expressed as follows (Leung & Cai 2005):

$$RCA_{ij} = \frac{s_{ij}}{s_i}$$

Which represents the ratio of the export of product j by country i (marked by Xij) to the global export of product j, and the expression represents the ratio of the total export of country i to the total world export. In fact, relation (9) evaluates the relative advantage of a country for exporting the desired product by measuring the competitiveness of country i in the market of product j and comparing it with the completely global competition. Accordingly, with the increase (decrease) of a country's market share, its competitiveness in the market becomes more (less). If the value of Balasa's revealed relative advantage index is larger (smaller) than one, the share of country i in the market of product j is larger (smaller) than the export share of that country in the world market, and as a result, it can be argued that the country's competitiveness The target in market j is more (less) than other markets and has (lacks) a competitive advantage revealed in the export market of product j. The relation (9) can be defined as follows:

$$RCA_{ij} = \frac{c_{ij}}{c_j}$$

Which represents the ratio of the export of product j by country i (marked by Xij) to the total export of that country, and the expression represents the ratio of global export of product j to the total world export. If the relation (10) is greater (smaller) than one, it can be argued that the expertise of country i in product j is higher (lower) than the global average and as a result, country i relatively has more (less) resources. Assigns to product j and has (lack of) comparative advantage (Leung and CAI 2005).

One of the disadvantages of Balasa's revealed relative advantage index is that the range of changes of this index is very large (between zero and infinity) and as a result, it is not possible to determine the intensity and degree of relative advantage or lack of relative advantage in a good way. did Based on this, another type of the mentioned index is proposed under the name of symmetric revealed relative advantage, whose range of changes is between -1 and +1. The closer the value of this index is to + (-1), the greater the relative advantage (lack of relative advantage). Based on this, the mathematical relation of the revealed symmetric relative advantage index can be shown as follows:

$$SRCA_{ij} = \frac{RCA - 1}{RCA + 1}$$

In the above equation, SRCA represents the revealed comparative advantage. An increasing (decreasing) trend in this index over time indicates an improvement in a country's competitive position in the export of product j at a global level and the effective utilization of emerging opportunities (Pakravan *et al.,* 2017).

RESULTS AND DISCUSSION

Based on the findings in Table 2, several conclusions can be drawn. In the income column, the shadow income generated from the average saffron production per hectare is lower than the market income from the same production. This indicates that an implicit tax is imposed on the producer. In Matrix J, the value is found to be less than zero, which suggests that domestic producers purchase imported inputs at prices higher than their global prices, resulting in an implicit tax collected from the producer.

Table 2: The results of the policy analysis matrix based on the equality of the relative purchasing power of saffron (Afghan).

Calculated based		Cost		Benefit
	Income	External Inputs	Internal Inputs	
According to private price	558572.02	82002.34	138554.9	338014.78
According to social price	322521.46	93523.96	147653.33	81344.18
Difference	-236050.6	-11521.6214	- 9098.43	326840.1

Sources: Research Findings

The shadow income generated from the average saffron production per hectare is less than the market income. This fact clearly indicates the existence of an implicit tax on producers, which can be seen as a tool of economic pressure. Such economic pressure may lead to social and political dissatisfaction, highlighting the need for reform policies.

Matrix J indicates that its value is less than zero, showing that domestic producers purchase imported inputs at prices higher than the global prices. This situation not only contributes to the emergence of economic inequalities but may also lead to increased dependence on imports and reduced economic independence. This dependence could pose a serious threat to the country's food security during times of crisis.

Matrix K demonstrates the payment of indirect subsidies to producers. While these subsidies can assist producers, they may also be used as a tool for controlling and managing the market by the government. These interventions may benefit producers in the long run; however, they can also foster corruption and economic misuse.

Matrix L shows a value greater than zero, indicating the positive impact of government interventions on the profits from saffron production. This situation can enhance the legitimacy of the government in the public's view, but it is important to note that these interventions must be implemented wisely and transparently to prevent social dissatisfaction.

Matrix H indicates a value greater than one, reflecting a comparative advantage in saffron production. This advantage can be perceived as an economic and political strength, creating new opportunities for export and the establishment of new markets.

Based on the findings, purchasing tradable and non-tradable inputs at prices higher than global prices underscores the need for government support and international institutions. This reliance on foreign support can create significant challenges for domestic economic policies and accentuate the necessity for developing independent and sustainable strategies.

Ultimately, the analysis shows that government interventions in the saffron market, while increasing profitability and supporting producers, also bring challenges such as economic inequalities, dependence on imports, and political risks stemming from public dissatisfaction. Therefore, the government must adopt comprehensive and transparent policies to strike a balance between supporting producers and maintaining the health of the market and society. These policies should not only benefit producers but also contribute to sustainable development and the economic independence of the country.

The results of comparative advantage indicators in the Policy Analysis Matrix (PAM).

Table 3: Policy Analysis Matrix Based on Relative Purchasing Power Parity of Saffron (Afghani).

Index	Purchasing power parity
DRC	0.644
NPCO	1.731
NPCI	0.876
EPC	2.081
SCB	0.747
NSP	81344.178
UCd	0.394
UCx	0.683

Source: research findings

The Relative Advantage Index (DRC) within the framework of the Policy Analysis Matrix (PAM) is less than one, indicating that saffron production in the country is more cost-effective than imports. This situation not only reflects a relative advantage in saffron production in the region but also acts as an economic opportunity for increasing exports and strengthening the domestic market. In a context where countries are seeking to reduce import dependency, this advantage can be considered a strategic asset for the nation.

The calculation of the Nominal Protection Coefficient (NPCO) shows that the shadow price of saffron is lower than the domestic price. This situation indicates the provision of indirect subsidies to producers, helping them remain competitive in a market environment. Such support from the government and international organizations can be viewed as a tool for strengthening domestic production and improving economic conditions. However, it is essential to ensure the transparency and efficiency of these supports to prevent corruption and economic misuse.

The calculation of the Net Social Profit (NSP) and Social Benefit (SCB) indicates that saffron production in Afghanistan has positively contributed to the country's social economy over a six-year period. This not only helps increase the income of producers but can also lead to poverty reduction and improved quality of life in saffron-producing regions.

The Internal Competitiveness Index (UCd) is less than one, indicating the cost competitiveness of saffron

against other products. This is significant as saffron producers can currently compete with other products. Additionally, the presence of cost competitiveness in exports suggests that saffron can also find a favorable position in global markets. This situation could facilitate foreign investment and enhance the country's economic standing.

The study shows that international support and government attention to promotional, educational, marketing, and packaging services have significantly aided saffron production. These supports not only contribute to sustainable development and increased productivity in the agricultural sector but can also strengthen international relations and create new markets for saffron exports.

Ultimately, the results of this study indicate that, given the relative advantages, government and international support, and the competitive capacity of saffron production, this product can be recognized as an important economic pillar in Herat province and even at the national level. These advantages can lay the groundwork for sustainable development and increased economic self-sufficiency in the country. Therefore, the government and decision-making bodies must effectively and intelligently leverage these capacities and create conditions for the further growth and development of this industry.

Table 4: Effect of Cost Changes on Comparative Advantage Indicators of Saffron.

Saffron Cost	Domestic resource cost	Nominal protection coefficient on output	Nominal input protection coefficient	Effective protection coefficient	Net social profit
30 percent enhance	0.84	2.25	1.13	2.71	105747.43
20 percent enhanced	0.78	2.07	1.05	2.49	27613.01
10 percent enhanced	0.71	1.9	0.96	2.28	89478.59
10 percent reduced	0.58	1.56	0.79	1.87	73209.76
20 percent reduced	0.52	1.38	0.70	1.66	65075.34
30 percent reduced	0.45	1.21	0.61	1.46	56940.92

The analysis of the impact of cost changes is conducted by decreasing and increasing costs by 10%, 20%, and 30%. This comprehensive analysis includes various costs such as fertilizers, seeds, pesticides, machinery, labor, water, transportation, and loading and unloading expenses.

The results indicate that with the reduction of costs, the Net Resource Cost (NRC) and Domestic Resource Cost (DRC) indices improve significantly. This improvement reflects higher efficiency in resource allocation and increased competitiveness of saffron production. In a context where countries seek to strengthen domestic production and reduce dependence on imports, these results can be considered an important strategic opportunity.

Interestingly, the Nominal Protection Coefficient (NPC) remains unchanged despite fluctuations in costs. This stability suggests that the market price of saffron is not influenced by internal cost changes and that external market conditions or regulatory frameworks may play a more significant role in determining this index. This situation raises the need for a review of policies to ensure that producers benefit from cost reductions.

The observed trend in the Nominal Protection Index for Inputs Cost (NPIC) shows a decline with the reduction of costs. This decrease is due to the constancy of shadow exchange rates, indicating that while production costs decrease, the benefits of these reductions may not fully translate into the competitiveness of input costs. This highlights the importance of simultaneously analyzing both production and input costs for a comprehensive understanding of competitiveness.

The downward trend in the Effective Protection Coefficient (EPC) and the decline in the Net Social Profit (NSP) index raise important questions about the economic viability of saffron production. This decrease suggests that, despite lower costs, the social outcomes associated with saffron production may not be maximized. Such findings emphasize the necessity for targeted government interventions to enhance social and economic results in the agricultural sector.

Overall, the analysis of cost changes reveals complex relationships among various indices of relative advantage. While reductions in production costs lead to improvements in the NRC and DRC indices, the stability of the NPC and the declines in NPIC, EPC, and NSP indicate challenges that need to be addressed. To take advantage of the benefits of reduced costs, policymakers should consider a multi-faceted approach that includes market regulation adjustments, strengthening support mechanisms, and creating a conducive environment for sustainable growth in saffron production. Through these actions, the country can strengthen its position in both domestic and international markets and achieve better economic outcomes and greater self-sufficiency.

Table 5: Comparison of Comparative Advantage, Support, and Competitiveness Indices of the Current Study with Nikzad *et al.* (2021) Study.

Index	Current Study	(2021) Study
DRC	0.64	**0.31**
NPCO	1.73	**0.61**
NPCI	0.87	**0.32**
EPC	2.08	**0.87**
SCB	0.74	**0.33**
UCd	0.39	**0.9**
UCx	0.68	**0.11**
NSP	81344.17	**134.73**

The results of the current study indicate that some indices have improved compared to the research conducted in 2021, while others show weaker outcomes. These differences may stem from variations in data sources or analytical methods used in each study. The current research might have utilized different data sources.

Overall, the 2021 study highlights significant improvements in government performance across various sectors. The findings suggest that the government has successfully attracted investment, facilitated investment processes, implemented relevant business regulations, ensured access to banking services and financial systems, and enhanced access to digital infrastructure and innovative technologies. However, certain indices remain unsatisfactory, particularly regarding the control of corruption and illegal activities in the business sector, as well as transparency and fairness in the business environment.

The differences in the NSP index may also result from changes in market conditions, input and product prices, shifts in government policies, and other factors that have led to variations in this index. In conclusion, the study reveals that the government has made progress in certain areas, but further efforts are still needed to enhance other sectors.

Table 6: Domestic Resource Cost Index in the Study by Nikzad *et al.* (2021).

Product	Index
	DRC
Irrigated Wheat	0.89
Rained Wheat	1.12
Poppy	0.34
Saffron	0.31

Based on the comparison of the Domestic Resource Cost (DRC) index for various products in Herat Province from the study by Nikzad *et al.* (2021), the following conclusions can be drawn:

The DRC index for irrigated wheat (0.89) is higher than the DRC index for saffron (0.42). This indicates that irrigated wheat has a higher domestic resource cost compared to saffron.

The DRC index for rainfed wheat (1.12) is also higher than the DRC index for saffron (0.42). In other words, the production of rainfed wheat is associated with a higher domestic resource cost than saffron.

On the other hand, the DRC index for poppy (0.34) is lower than the DRC index for saffron (0.42). This suggests that saffron production has a lower domestic resource cost compared to poppy.

Results of Comparative Advantage Evaluation for Export: The export of high-quality saffron from Afghanistan, along with its competitive advantage, can significantly contribute to the economic and social development of the country. Advantages such as foreign exchange earnings, job creation, rural development, enhanced national reputation, and trade balance can be achieved. Utilizing these benefits, Afghanistan can establish itself as a reliable producer and exporter of saffron in the global market and attain substantial economic benefits.

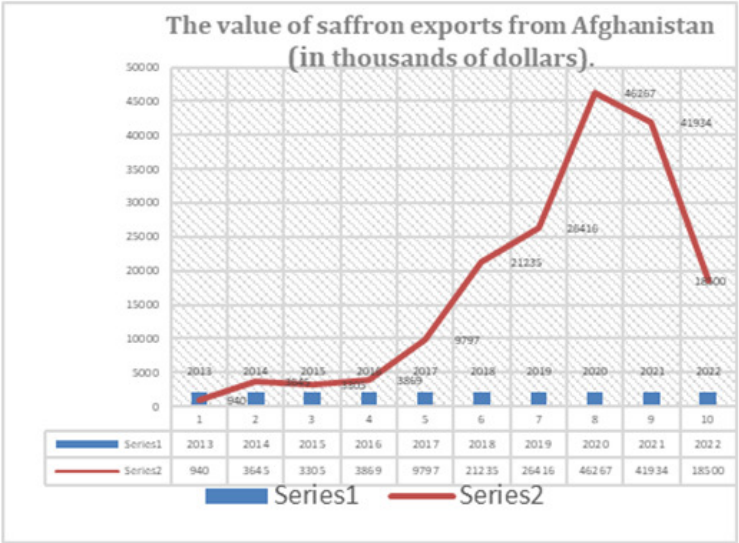

Fig. 1. Value of Saffron Exports from Afghanistan (in thousands of dollars) from 2013 to 2022 (International Trade Centre, 2022).

According to statistics from the International Trade Centre, it is evident that the value of saffron exports from Afghanistan in 2022 ($18,500 thousand) decreased compared to 2021 ($41,934 thousand). This decline may be attributed to various factors such as changes in government policies, production levels, prices, target markets, and export policies. Nevertheless, despite the export value in 2022, Afghanistan still holds a significant position among countries that export saffron substantially.

Based on the value of saffron exports by countries in 2022, it can be said that Afghanistan held a relatively high position among these countries with its export value. With a value of $18,500 thousand, Afghanistan ranked higher compared to some countries like Ethiopia, Hong Kong, and China. However, in comparison with countries such as Iran, the Netherlands, Spain, and France, Afghanistan still seeks growth and an increase in its saffron export value. Therefore, Afghanistan experienced a decline in the value of its saffron exports in 2022 compared to previous years.

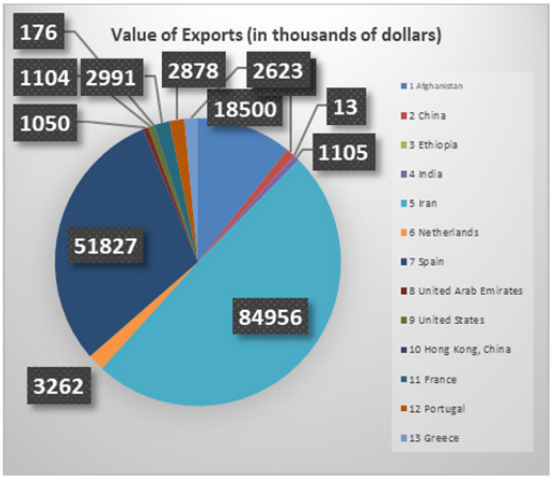

Fig. 2. Value of Saffron Exports by Countries in 2022.

Table 7: Results of the Comparative Advantage of Saffron Exports.

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Index
Afghanistan	133.627	370.928	351.602	255.854	463.175	994.321	1404.500	1362.666	1615.663	1526.139	RCA
	0.985	0.995	0.994	0.992	0.996	0.998	0.999	0.999	0.999	0.999	SRCA
China	0.032	0.035	0.076	0.059	0.030	0.049	0.009	0.007	0.015	0.065	RCA
	-0.939	-0.932	-0.859	-0.889	-0.941	-0.906	-0.983	-0.987	-0.970	-0.879	SRCA
Ethiopia	1.044	2.067	0.180	1.598	0.302	0.184	0.103	0.191	0.377	0.547	RCA
	0.021	0.348	-0.694	0.230	-0.536	-0.689	-0.813	-0.679	-0.453	-0.293	SRCA
India	0.369	0.338	0.370	0.209	0.206	0.106	0.142	0.322	0.189	0.317	RCA
	-0.461	-0.494	-0.460	-0.654	-0.659	-0.809	-0.752	-0.513	-0.681	-0.519	SRCA
Iran	143.419	146.311	167.349	144.154	139.618	148.940	280.556	248.934	157.685	707.233	RCA
	0.986	0.986	0.988	0.986	0.986	0.987	0.993	0.992	0.987	0.997	SRCA
Netherlands	0.093	0.114	0.433	0.363	0.340	0.241	0.330	0.169	0.237	0.550	RCA
	-0.829	-0.795	-0.396	-0.467	-0.493	-0.612	-0.504	-0.711	-0.616	-0.290	SRCA
Spain	9.990	8.580	10.351	9.129	7.588	6.603	6.501	8.344	8.679	15.860	RCA
	0.818	0.791	0.824	0.803	0.767	0.737	0.733	0.786	0.793	0.881	SRCA
United Arab Emirates	0.765	0.325	1.453	0.286	0.983	0.299	0.300	1.276	1.858	0.438	RCA
	-0.133	-0.510	0.185	-0.555	-0.008	-0.540	-0.539	0.121	0.300	-0.391	SRCA
Canada	0.217	0.151	-0.738	0.079	0.065	0.071	0.084	0.116	0.199	0.119	RCA
	-0.643	-0.738	-0.832	-0.854	-0.879	-0.867	-0.844	-0.792	-0.668	-0.788	SRCA
United States	0.024	0.016	0.015	0.010	0.012	0.013	0.016	0.032	0.038	0.069	RCA
	-0.953	-0.969	-0.970	-0.980	-0.977	-0.975	-0.968	-0.937	-0.927	-0.870	SRCA
Hong Kong, China	0.035	0.010	0.106	0.398	0.392	0.447	0.467	0.234	0.409	0.037	RCA
	-0.933	-0.980	-0.808	-0.431	-0.436	-0.382	-0.364	-0.620	-0.419	-0.928	SRCA
France	0.461	0.724	0.762	0.530	0.557	0.340	0.370	0.423	0.465	0.640	RCA
	-0.369	-0.160	-0.135	-0.308	-0.285	-0.492	-0.460	-0.406	-0.365	-0.220	SRCA
Portugal	75.126	108.795	158.145	50.596	33.078	19.738	22.688	20.032	24.770	37.541	RCA
	0.974	0.982	0.987	0.961	0.941	0.904	0.916	0.905	0.922	0.948	SRCA
Greece	1.266	2.338	3.795	4.520	5.119	4.507	3.796	6.453	9.930	5.916	RCA
	0.117	0.401	0.583	0.638	0.673	0.637	0.583	0.732	0.817	0.711	SRCA

Source: International Trade Centre.

Based on the provided information, Table 7 uses the revealed comparative advantage (RCA) index. This index is calculated using post-trade figures and is used for a comparative analysis of the relative advantages of saffron-exporting countries.

The results of the comparative advantage evaluation for saffron exports are presented in Table 7, where the values of the export comparative advantage indices (RCA) and (SRCA) are greater than one. These results indicate that Afghanistan has a comparative advantage in saffron exports and is moving towards specialization in this product. Values less than one in these indices signify a lack of comparative advantage in saffron exports. Additionally, changes in these indices over

time are interpreted as shifts in the relative advantage of a commodity. Such changes may occur for various reasons, including a relative decrease in production costs, changes in exchange rates, or shifts in domestic trading resources or countries demanding the commodity.

As shown in Table 7, according to both measures of export comparative advantage, the countries Afghanistan, Iran, Spain, Portugal, and Greece had a comparative export advantage from 2013 to 2022. Conversely, countries such as China, the Netherlands, the United Arab Emirates, Hong Kong, and India exhibited a lack of comparative export advantage during the mentioned period.

FUTURE SCOPE

Saffron production in Herat province of Afghanistan is recognized not only as an agricultural activity but also as a social and economic catalyst in the region. Given the geographical and climatic advantages of Herat, this province is emerging as a hub for saffron production at both national and international levels. Saffron cultivation, due to its high economic value and global demand, provides a suitable opportunity for farmers to increase their income and reduce dependence on opium poppy cultivation. This shift can lead to improved economic conditions for farmers and contribute to the sustainable development of local communities.

On the other hand, in the past 20 years, the support of the Afghan government has played a crucial role in strengthening the saffron industry. The government has facilitated growth in this sector by providing financial assistance, technical training, and infrastructure development. These supports not only enhance saffron production and exports but also strengthen the competitive capacity of farmers. Given that saffron can serve as a suitable alternative to opium poppy, these policies help reduce narcotics production and improve national security.

The political analysis of this process indicates that saffron development can improve Afghanistan's relations with other countries and attract international support. In light of the need to combat drug trafficking, saffron production as a sustainable economic option can serve as an effective strategy to mitigate political and social tensions. Afghanistan's accession to international trade organizations and the establishment of export agreements can facilitate increased trade and economic opportunities in this area.

The social dimensions of this transition are also significant. As saffron production increases, more job opportunities will arise for youth and women in rural communities. This not only helps reduce poverty but also strengthens the role of women in the economy. Furthermore, improved infrastructure and increased access to markets will enhance the quality of life for people, fostering a community more committed to sustainable development.

Ultimately, to achieve these goals, long-term planning and continuous evaluation of supportive policies are necessary. Improving production quality, adhering to global standards, and investing in saffron export development are among the actions that policymakers should prioritize. With this comprehensive approach, Afghanistan can strengthen its position in the global saffron market and achieve sustainable economic and social development.

other policies should also be considered. Reforming the production structure, increasing productivity of production factors, improving product quality, adhering to global standards, and investing in saffron export development are actions that policymakers should prioritize.

CONCLUSIONS

This study underscores the strategic importance of saffron production in Herat Province, Afghanistan, highlighting its comparative advantage in both domestic cultivation and international exports. The findings suggest that the Afghan government's proactive support has been instrumental in enhancing the competitiveness of local producers, positioning Afghanistan as a significant player in the global saffron market. By leveraging its unique resources and fostering a conducive environment for investment, the country can capitalize on this lucrative agricultural sector.

Furthermore, the promotion of saffron not only contributes to economic growth but also plays a crucial role in stabilizing local communities by creating jobs and reducing dependency on illicit economies. Therefore, it is imperative for policymakers to implement targeted strategies that extend support to regions with favorable conditions for saffron cultivation. Such measures will not only enhance production capabilities but also strengthen Afghanistan's position in international trade, ultimately contributing to broader economic resilience and sustainable development across the nation.

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REFERENCES

Abbas, S., & Waheed, A. (2017). Trade competitiveness of Pakistan: evidence from the revealed comparative advantage approach. Competitiveness Review. *An International Business Journal, 27*(5), 462-475.

Abdurofi, I., & Ismail, M. M. (2021). Stingless bees farming in Malaysia: a policy analysis matrix (PAM). *Journal of Apicultural Research*, 1-13.

Abedi, S., Peikani, G., & Hosseini, S. (2008). Examining the comparative advantage of corn in the optimal cultivation pattern in Khuzestan province. *Iranian Journal of Agricultural Economics and Development Research*, *39*(1), 85-97.

Aghaei, M., & Razaghalizadeh, M. (2011). Examining Iran's comparative advantage in saffron production. *Economics and Agricultural Development*, *25*(1), 121-132.

Ansari, V. & Salami, H. (2016). Decomposition of the effect of technological change on output growth in Iranian agricultural sector: A structural decomposition

analysis. *Iranian Journal of Agricultural Economics and Development Research, 46*(4), 465-781.

Ashrafi, M., Karbasi, A., & Sadr-al-Ashrafi, S. (2017). Revealed comparative advantage of production and export of raisins in Iran. *Agricultural Economics and Development*, *15*(58), 39-61.

Ayoola, O. T., and Makinde, E. A. (2007). Fertilizer treatment performance of cassava under two planting pattern in a cassava-based cropping system. *Research Journal of Agriculture and Biological Sciences, 3*, 13-20.

Barry, C. (1992). The Economics of Agricultural Policy. CRS Report for Congress, 92 -198 ENR. 5.

Benalywa, Z. A., Ismail, M. M., Shamsudin, M. N. & Yusop, Z. (2019). Assessing the comparative advantage of broiler production in Peninsular Malaysia using policy analysis matrix. *Tropical animal health and production, 51*(2), 321-327.

Ceylan, N. (2019). Revealed comparative advantage of Turkish and Hungarian wheat sectors. *Problems of World Agriculture/Problemy Rolnictwa Światowego, 19*(1827-2019-4170), 16-22.

Ceylan, R. F., Sayin, C., Ozkan, B., Akpinar, M. G., & İlbasmiş, E. (2018). Comparative advantage analysis for Turkish grape and cherries export market. *International Journal of Agriculture Forestry and Life Sciences, 2*(2), 75-86.

ELsamie, M. A., Ali, T., & Eliw, M. (2020). Impact of agricultural policies on the Egyptian cotton sector using policy analysis matrix. *Asian Journal of Economics, Business and Accounting, 15*(1), 50-59.

Fathi, Y., Kavoosi Kalashami, M., & Khodaverdizadeh, M. (2015). Application of policy analysis matrix in measuring competitiveness and readiness of firms for accession to the World Trade Organization (WTO) (Case study: company (A) from the dairy products industry). *Iranian Journal of Applied Economic Studies*, *4*(14), 113-139.

Firlej, K., & Kubala, S. (2018). The assessment of export potential of agricultural and food products in the Visegrad Group countries in the years 2005–2017. In Proceedings of the International Scientific Conference" Economic Sciences for Agribusiness and Rural Economy" (No. 2). Warsaw, 167-173.

Fung, G. (2004). The average and marginal domestic resource cost of foreign exchange. *Oxford Economic Papers, 47,* 675-663.

Gardner, B. and Rausser G. C. (1998). Agriculture and Macro Economy. Hanbook of Elsevier Science. Hanbook of Agricultre Economic.

Haryanto, L. I., Masyhuri, M., & Irham, I. (2018). The policy analysis matrix in measuring competitiveness of maize farming system in marginal areas. *Agro Ekonomi, 29*(2), 244-260.

Hatef, H., Sarvary, A. & Daneshvar Kakhki, M. (2016). Determining of Crop Optimal Pattern, the Main Crops of Cultivated of Khorasan Razavi Province Based of Production Comparative Advantage. *Journal of Agricultural Economics Research, 8*(31), 167-192.

Hosseini, S.S., Etghaei Kordkalaei, M. & Kavousi Kalashmi, M. (2009). Investigating the competitiveness of Iranian rice in Guilan province. *Journal of Agricultural Economics Research, 2* (3), 104-91.

Huang, J., Song, J., Qiao, F. & Fuglie, Q. (2003). Sweet potato in China: Economic aspect and utilization in pig production. International potato center (IPC), Bogor, Indonesia.

International Trade Center (2020). Trade Map Statistics. http://www.trademap.org.

Jagdambe, S. (2019). Consistency test of revealed comparative advantage index: Evidence from India's agricultural export. *Foreign Trade Review, 54*(1), 16-28.

Jalilpiran, H., & Naseri Askui, N. (2015). Analysis of comparative and competitive advantages of major agricultural products in Alborz province. *Economic Journal*, *15*(3 & 4), 41-62.

Julaye, r. & Jeiran, A. (2008). Comparative advantage or self-sufficiency? A practical study in determining the wheat production strategy in the country. *Journal of Agricultural Economics and Development, 13* (62), 158-147. (In Farsi)

Kim, M. J., & Thunt, H. O. (2017). An analysis of export competitiveness in Myanmar: Measuring revealed comparative advantage. *Journal of International Trade & Commerce, 13*(2), 149-172.

Lagos. G.e., Mardones, F. (2003). Development domestic resource cost approach to identify the economic and environmental impact of trade: The mining sector of Chile, Catholic University of Chile Santiago.

Leung, P., & CAI, J. (2005). A review of comparative advantage assessment approaches in relation to aquaculture development. University of Hawaii at Manoa, 1-23.

M., Shahnooshi, N, Daneshour Kakhaki, & Khajeh Roshanai, N. (2017). Assessing and determining the comparative advantage of agricultural products in Khorasan Razavi province with a focus on water. *Agricultural Economics and Development*, *18*(71), 121-140.

Maryam, J., Banday, U. J., & Mittal, A. (2018). Trade intensity and revealed comparative advantage: an analysis of Intra-BRICS trade. *International Journal of Emerging Markets, 13*(5), 1182-1195.

Mirlotfi, M. R., Alavi Zadeh, S. A. M., & Safarpour, N. (2013). Evaluating the spatial distribution and factors influencing the international marketing of saffron in Afghanistan. *Research and Rural Planning*, *2*(3), 97-113.

Mohammadi, Y., Iravani, H. & Kalantari, K. (2014). Sustainability Assessment of Rice Production in Iran. *Iranian Journal of Agricultural Economics and Development Research, 45*(1), 79-90.

Mohammadian, Y., Shalalvand, M. And Rezapour, K. (2019). Determining the optimal cultivation pattern of crops in production units by analyzing regional and national comparative advantage. *Iranian Journal of Agricultural Economics and Development Research, 1*(4), 2-49.

Monke, E. and Pearson, S.R. (1989) The Policy Analysis Matrix for Agricultural Development. Cornell University Press, Ithaca.

Nikzad, M. (2012). A Study of Factors Affecting the Supply of Poppy (Drugs) in Afghanistan, Master Thesis, Faculty of Economics and Agricultural Development, University of Tehran.

Nikzad, M., Hosseini, S., Salami, H., Chizari, A., & Ahadi, A. (2021). Evaluating and analyzing the comparative advantages, competitiveness, and effects of supportive policies for selected agricultural-economic products in Afghanistan. *Journal of Agricultural Economics and Development Research*, *53*(2), 14.

Page, G. M. (2002). Technical efficiency and economic performance: some evidence from Ghana. *Oxford Economic Papers 32*(2), 319-339.

Pakravan, M., Mehrabi Basharabi, H., Gilanpour, A., & Ismaili, F. (2017). Analysis of pistachio export status in Iran with a focus on comparative advantage and trade mapping. *Agricultural Economics and Development*, *19*(76), 1-26.

Pilusa, K. V., Belete, A., & Baloi, V. A. (2020). Analysing chicken meat production comparative advantage of

South Africa. *African Journal of Agricultural Research, 16*(6), 843-849.

Rahmani, K. & Moalmi, S. (2010). Determining the Comparative Advantage of Food Industry in East Azerbaijan Province (Based on indirect productive advantage and commercial advantage). *Journal of Productivity Management (Beyond Management), 3*(12), 97- 134.

Saad, A., Zhang, R., & Xia, Y. (2019). The policy analysis matrix (PAM): comparative advantage of China's wheat crop production 2017. *Journal of Agricultural Science (Toronto), 11*(17), 150-157.

Saban, Y., Mehmt, A., and Mustafa, E. (2007). Identification of advantage of maize- legume intercropping over solitary cropping through competition indices in the esat mediterranean region. *Turkish Journal of Agriculture 32*, 111-119.

Serin, V. & Civan, A. (2008). Revealed comparative advantage and competitiveness: A case study for turkey towards the EU. Journal of Economic and Social Research, 10, 25-41.

Shahabuddin, Q. & Dorosh, P. (2002). Comparative advantage in Bangladesh crop Production. *International Food Policy Research institute,* (595), 26-39.

Souza, Â. R. L. D., Revillion, J. P. P., Waquil, P. D., Belarmino, L. C., & Lanfranco, B. A. (2017). Economic and accounting evaluation of rice milled production chains in Rio Grande do Sul (Brazil) and Uruguay with application of the Policy Analysis Matrix. *Ciência Rural, 47* (4), 1-7.

Tavakoli, M., Zibaei, M. & Fathi, F. (2020). Management and Supervision Policies on Poppy Production in Afghanistan. *Journal of Agricultural Economics (Economics and Agriculture), 13* (1), 1-25. (In Farsi)

Warr, P. G. (2002). Domestic resource cost as an investment criterion. *Oxford Economic Papers, 35,* 302-306.

Wurtenberger, L., Koellner, T., and Binder, C. R. (2006). Virtual land use and agricultural trade: Estimating environmental and socioeconomic impacts. *Ecological Economics, 57,* 679-697.

Yazdani, S. and Azizi, H. (2006). Survey of apple export market with emphasis export Comparative advantage. *Research and Development 73,* 145-155.

Zhong, F. & Fu, L. (2004). Regional comparative advantage in China main grain crop, Aciar China Grain Market Policy Project Paper, No. 1.

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