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RESEARCH PAPER

Export competitiveness and direction of trade of almonds from Afghanistan

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Abstract: The study aims to reveal the competitiveness and direction of trade of almonds from Afghanistan. The data was analysed for Nominal Protection Coefficient, Revealed Comparative Advantage (RCA) and Markov chain analysis to understand the transition probability of almonds between different countries in the context of quantity. The secondary data for almonds was analyzed for the period of 2006-07 to 2020-21. The results indicated that the Afghanistan almonds were very responsive to the share of exports of the country. During the period considered under the study, lower nominal protection coefficient value for UAE was 0.76 followed by 0.79 and 0.82 India and Turkey respectively, which were less than one for the year 2022-23, indicating that UAE, India and Turkey had high export competitiveness than others. The range of RCA indices for Afghanistan was 43.95 to 670.71 followed by USA and Spain 6.83 to 8.43 and 4.64 to 7.86 respectively and the average value of RCA in the global market was highest for Afghanistan 178.61 followed by USA, Spain and Australia which were 7.81, 5.71 and 3.51 respectively. In case of transitional probability matrix for almonds exported quantity from Afghanistan during study period, Pakistan and India retained 96.93 and 31.00 per cent of their original share respectively. Where as other countries retained 32.21 per cent of their original share. Turkey lost 100.00 per cent of its share to others, UAE lost to India, Germany and Turkey in the proportion of 60.28, 23.02 and 16.70 per cent respectively, similarly Germany lost 70.21 per cent to India and 29.79 per cent to others, Iran and Iraq lost 100.00 and 83.67 per cent of their share to Pakistan and Turkey respectively, other countries lost 65.97 per cent of their share to India. The results revealed that Afghan almonds had more competitive advantages compared to others countries in global markets.

Key words: Almonds, Afghanistan, Nominal protection coefficient, Revealed comparative advantage,Transitional probability matrix

Introduction

Agriculture plays an important role in the Afghanistan's economy, 12 per cent of its area is arable which includes irrigated area, rain-fed land, and temporary fallow land 2.7 per cent of its area is covered by the forest, 46.4 per cent by permanent pasture and 38.9 per cent villages, mountains and rivers. Rain-fed wheat is an important cereal crops in Afghanistan. Dried fruit and nuts especially apricot and almond play a significant role in exports from Afghanistan. During 2020-21, almost 3.38 per cent of the arable land (265 thousand hectares) was under fruit cultivation. The dried fruits and nuts sector has historically been one of Afghanistan's leading categories among agricultural exports.

Afghanistan produces a wide array of dried fruits and nuts (with many different varieties of raisins and almonds alone), with unique tastes that have attracted buyers throughout the region. Afghanistan's weather and soil conditions are well-suited for the production of special fruits and nuts, with local producers possessing a wealth of expertise on traditional processing methods for fruit drying and nut roasting and shelling. While these traditional methods have kept the sector producing and exporting through very difficult times, they have also constrained the sector's future potential. Traditional methods have kept output volumes low, limiting economies of scale and keeping prices relatively high (compared with industrial-level dried fruits and nuts operations in the United States of America). More alarmingly, traditional methods have led to quality and food safety concerns for buyers (and governments) in Western markets. This has severely limited the diversity of Afghanistan's export destinations and cut off access to buyers in developed markets willing to pay premium prices for premium products.

At present, Afghan exports of almonds are concentrated in a few regional markets, namely India and Pakistan. This leaves the sector with exciting opportunities to expand its export reach in both East and the West, but this can only be accomplished with a concerted effort to develop a premium brand and address quality control and food safety issues. The producation of dried fruits and nuts are labor-intensive, with entire households and communities contributing to different activities along the value chain. A thriving dried fruits and nuts sector will inevitably lead to improvements in the quality of life of the communities connected to the sector. Recognizing these opportunities and challenges, public and private sector stake holders have joined forces to de-velop this Dried Fruits and Nuts Sector Export.

The local almond purchase agencies face lots of problems because neighboring countries have their own agents and they purchase dry fruits directly from rural areas. The production of almond is increasing very fast in recent years. The northern and southwestern parts of country have the highest area under cultivation with Samangan, Kandahar, Balkh, Uruzgan,Sar-e Pol, Kunduz and Daykundi which produce much quantity of almonds. Usually, two types almonds are commonly cultivated in Afghanistan the first one is soft shell almonds which is locally

called as kaghazibadam (literally, "soft almonds") which has soft shell and can be broken easily by hand and another one is hard shell varitey which is locally known as sangibadam (literally, "stone almond"). Afghanistan's almond is exported to neighboring countries like India, Pakistan, China, UAE and Iran and also to some of the European countries (Elyas and Nassir 2020).

Over the last decade, global tree nut production has steadily increased, reaching over 5.3 million metric tons during season 2020-21, up 15 per cent from 2019-20 and 65 per cent higher than a decade earlier. Between seasons 2011-12 and 2020-21, global tree nut production increased at an average annual rate of about 212,400 metric tons per year. Almonds were the largest crops, accounting for 31 per cent of the global share, while analyzing the annual growth rates of almond crops had the most important linear increments with the annual growth rates of 53,885 metric tonnes per annum. Almonds consumption increased significantly over the studied period across the consuming nations. Almonds in shell fresh or dried was the world's 1557th most traded product, with a total trade of $1.53 billion during 2019-20. Between 2018 and 2019 the exports of almonds in shell fresh or dried grew by 7.61 per cent, from $1.42 billion to $1.53 billion. Trade in almonds in shell fresh or dried represent 0.0084 per cent of total world trade.

Material and methods

The study on export competitiveness and direction of trade of almonds was purposively taken up Afghanistan. The secondary data on export competitiveness and direction of trade of almonds were used to analyze the Nominal Protection Co-efficient, Revealed Comparative Advantage and direction of Afghan almonds trade. The time series data for direction of trade of almonds was available from 2010-11 to 2020-21. The data pertaining to export of almonds was obtained from different website such as Dried Fruits and Nuts Sector, Central Statistics Organization (CSO), Afghanistan statistical yearbooks, International Trade Centre (ITC), Food and Agricultural Organization (FAO) and other related sources. For the analyses of export competitiveness and direction of trade NPC, RCA and Markov Chain were employed. A minimum of ten years' data was selected for the study.

Export competitiveness

Nominal Protection Co-efficient

Nominal Protection Co-efficient (NPC) of Afghan almonds was estimated for the year 2022-23 in order to examine its export competitiveness in the world markets.

Nominal Protection Co-efficient is a direct measure ofcompetitiveness of a country in the context of free trade. The Nominal Protection Co-efficient (NPC) is defined as the ratio of domestic price to world reference price of the commodity under consideration.

Symbolically

$$NPC = \frac{Pd}{Pr}$$

Where,

NPC = Nominal Protection Co-efficient

Pd = Domestic price of the commodity in question

Pr = World reference price of the commodity in question *i.e.* What the farmer would have received in case of free trade.

NPC can be estimated under two main hypotheses *i.e.* under importable hypothesis and exportable hypothesis. A decision criterion is, if NPC is less than one, then the commodity is competitive (under importable hypothesis it is considered as a good import substitute and under a good exportable hypothesis, it is worth exporting) if NPC is greater than one, the commodity is not competitive (not a good import substitute or not worth exporting),the domestic price is normally the wholesale market price of the commodity in the selected market, the reference price is international price adjusted for transfer cost, market and trading margin including the processing charge necessary to make the commodity equivalent in the international traded commodity.

NPC<1 an efficient import substitute

Under exportable hypothesis.

NPC<1 an efficient import substitute

In the present study, Nominal Protection Co-efficient (NPC) was estimated under exportable hypothesis for the year 2015-16, Nominal Protection Co-efficient and international reference in the case of exportable hypothesis are calculated (Birol and Kazm 2014).

Revealed Comparative Advantage (RCA)

In this study, Revealed Comparative Advantage (RCA) has been used to compute comparative advantage on the basis of a country's specialization in exports relative to some reference group countries. The Revealed Comparative Advantage (RCA) index is measured by this formula

$$RCA = \mathrm{Ln}\left[\frac{X_{iB}/X_B}{Xi_A/X_A}\right]$$

Where,

XiB : Afghanistan's exports of dried fruits i to a particular country group

XB : Afghanistan's total dried fruits export to the particular country group

XiA : The rival country's exports of good i to a particular country group

XA : The rival country's total dried fruits export to the particular country group

If the RCA value is positive, then it is interpreted that Afghanistan has comparative advantage over its competing countries. Negative value of RCA indicates that rival countries has comparative advantage against Afghanistan in particular commodity export (Tyagi *et al.*,2014).

Direction of foreign trade

In order to study the direction and composition of export of selected dried fruits, Markov Chain Analysis was employed. Annual export data for period 2010-11 to 2019-20 were used to analyze the direction of trade and changing pattern of dried fruits export. Estimation of the exports was done for the study period using Markov chain analysis.

The Markov chain analysis is employed to analyze the structural change in any system whose progress through time can be measured in terms of single outcome variable. In the present study, the dynamic nature of trade patterns that is the gains and losses in export of dried fruits in major importing countries was examined using the Markov chain model. Markov chain analysis involves developing a transitional probability matrix 'P', whose elements, P_{ij} indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element P_{ij} where I=j, measures the probability of a country retaining its market share or In other words, the loyalty of an importing country to a particular country's exports.

In the context of current application, structural change was treated as a random process with seven importing countries for dried fruits with the assumption that the average export of dried fruits from Afghanistan amongst importing countries in any period depends only on the export in the previous period and this dependence is same among all the periods. This is algebraically expressed as:

$$Ejt = \sum_{i=1}^{n} [Ei_{t-1}]P_{ij} + e_{jt}$$

Where,

E_{jt} = Exports from Afghanistan to the j^{th} country in the year t

E_{it-1} = Exports of i^{th} country during the year t-1

P_{ij} = The probability that exports will shift from i^{th} country to j^{th} country

e_{jt} = The error term which is statistically independent of E_{it-1}

n = The number of importing countries

The transitional probabilities P_{ij}, which can be arranged in a (c x n) matrix, have the following properties.

$$\sum_{i=1}^{n} P_{Ij} = 1 \quad \text{and} \quad 0 \pounds P_{Ij} \pounds 1$$

Thus, the expected export share of each country during period't' is obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. The probability matrix was estimated for the period 2010-11 to 2019-20.

Thus transitional probability matrix (T) is estimated using linear programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD).

Min, OP* + I e

Subject to,

X P* + V = Y

GP* = 1

P* ³ 0

Where

P* is a vector of the probabilities P_{Ij}

O is the vector of zeros

I is an appropriately dimensional vectors of areas

e is the vector of absolute errors

Y is the proportion of exports to each country.

X is a block diagonal matrix of lagged values of Y

V is the vector of errors

G is a grouping matrix to add the row elements of P arranged in P* to unity (Manjunath *et al.,* 2017).

Results and discussion

The Table1 indicates the lower nominal protection coefficient values,which shows that the value for UAE was (0.76) followed by India (0.79), Turkey (0.82), Pakistan (0.85), Germany (0.87), Iran (0.85) and Iraq (0.90) and they were less than one for the year 2022-23 indicating that UAE, India and Turkey showed higher export competitiveness than Pakistan, Germany, Iran and Iraq and the similar results was obtained by (Anjum and Khan, 2017). In other words, higher price of almonds in the international market than the domestic market showed distinct comparative price advantage in favour of Afghanistan.

Table .1 Export competitiveness of Almonds from Afghanistan 2022-23

Particulars	Unit	India	Pakistan	Turkey	UAE	Germany	Iran	Iraq
Wholesale price (Chabahar port)	Af./qtl	55000	55000	55000	55000	55000	55000	55000
Marketing margin (5%)	Af./qtl	2750	2750	2750	2750	2750	2750	2750
Port clearing & handling charges	Af./qtl	350	350	350	350	350	350	350
FOB Price (1+2+3)	Af./qtl	58100	58100	58100	58100	58100	58100	58100
Freight charge	Af./qtl	450	350	480	380	630	250	480
Insurance at 2 % of price	Af./qtl	1162	1162	1162	1162	1162	1162	1162
Landed cost (4+5+6)	Af./qtl	59712	59612	59742	59642	59892	59512	59742
Exchange rate	US$=Af	89	89	89	89	89	89	89
CIF price (row 7 / row 8)	US$ /qtl	670.92	669.80	671.26	670.13	672.94	668.67	671.26
Reference price	US$ /qtl	852.27	790.00	815.00	880.00	770.00	790.00	750.00
NPC of (row 9/row 10)		0.79	0.85	0.82	0.76	0.87	0.85	0.90

Note:FOB:Freighton Board:CIF:Cost, Insurance and Freight

Table 2. Relative comparative advantage of almonds in global market (2006-07 to 2020-21)

Year	Afghanistan	USA	Spain	Australia	Germany	Netherlands	Turkey	Italy	Belgium	Chile	UAE
2006-07	43.95	7.92	7.86	1.53	0.20	0.53	0.30	0.72	0.50	1.76	1.66
2007-08	104.92	7.93	6.53	2.46	0.21	0.51	0.91	0.50	0.54	2.43	1.72
2008-09	287.71	8.32	5.99	2.17	0.21	0.38	1.31	0.42	0.58	3.17	1.74
2009-10	670.71	7.99	5.02	2.87	0.18	0.34	1.73	0.36	0.39	2.78	1.53
2010-11	209.05	8.34	5.65	2.46	0.19	0.37	1.46	0.42	0.40	2.52	1.62
2011-12	282.08	8.43	5.16	2.02	0.20	0.48	1.60	0.41	0.43	3.00	1.81
2012-13	105.43	8.08	4.64	2.24	0.20	0.47	1.61	0.42	0.36	2.50	1.79
2013-14	138.23	7.97	4.69	3.93	0.25	0.48	2.16	0.43	0.39	2.40	1.75
2014-15	156.38	7.67	5.54	4.45	0.25	0.53	2.03	0.56	0.42	1.61	2.05
2015-16	110.83	6.83	6.85	6.42	0.24	0.46	0.97	0.53	0.49	3.04	2.24
2016-17	131.18	7.15	5.45	4.41	0.23	0.55	1.13	0.60	0.47	1.99	1.79
2017-18	107.12	7.60	5.16	4.12	0.22	0.54	1.47	0.54	0.32	1.68	1.71
2018-19	109.35	7.58	5.59	4.68	0.25	0.54	1.32	0.60	0.30	2.19	1.88
2019-20	128.75	7.20	5.68	5.00	0.25	0.59	1.36	0.61	0.36	2.52	2.17
2020-21	93.46	8.13	5.81	3.93	0.28	0.65	1.60	0.71	0.32	1.57	1.80
Mean	178.61	7.81	5.71	3.51	0.22	0.49	1.40	0.52	0.42	2.34	1.82

Note: If RCA < 1: comparative disadvantage, RCA =1: comparative neutral, RCA >1: comparative advantage

Revealed comparative advantage of almonds export from top countries were computed for the period from 2006-07 to 2021-22 and the results are presented in Table. 2 During the period considered under study, RCA of top exporting countries like Afghanistan, USA, Spain, Australia, Germany, Netherland, Turkey, Italy, Belgium, Chile and UAE was estimated. During 2006-07 to 2020-21, RCA for Afghanistan ranged from 43.95 to 670.71 followed by USA which ranged from 6.83 to 8.43 and Spain, Australia and Germany was also relatively high with 4.64 to 7.86, 1.53 to 6.42 and 0.18 to 0.28, respectively and the average value for almond RCA in the global market was higher for Afghanistan 178.61 followed by USA, Spain and Australia which were 7.81, 5.71 and 3.51, respectively, the remaining countries Germany, Netherland, Turkey, Belgium, Chile and UAE were having an average RCA of 0.22, 0.49, 1.40, 0.52, 0.42, 2.34 and 1.82 respectively the same result was obtain by (Sunil *et al.,* 2023).

Afghanistan appears to have consistently held a significant comparative advantage in almond production and exports throughout the period. The factors responsible were climatic conditions, soil quality, government policies, and expertise in almond cultivation. Other countries also have improved their production methods leading to an increase in their relative advantage over time.economic conditions and global almond demand have influenced the relative comparative advantage of these countries. Countries with a high comparative advantage will aim to capitalize on it by investing more in almond production while others need to reevaluate their strategies to reach their targets. It will speculate on potential changes in comparative advantage in the coming years. The technological advancements, climate change, and shifts in global demand could influence these trends (Josily *et al.,* 2015).

The transitional probability matrix for quantity of almonds exported from Afghanistan during the period 2006-07 to 2020-21 are presented in the Table 3.The major importing countries are India, Pakistan, Turkey, UAE, Germany, Iran and Iraq and the remaining importing countries are grouped under the others category. Pakistan and India retained 96.93 and 31.00 per cent of their original share, respectively. Whereas other countries retained 32.21 per cent of their original share. Turkey lost 100.00 per cent of their share to others countries, UAE lost 60.28 per cent to India, 23.02 per cent to Germany and 16.70 per cent to Turkey, similarly Germany lost 70.21 per cent to India and 29.79 per cent to others, Iran lost their 100.00 per cent share to Pakistan, Iran lost 83.67 per cent to Turkey and other countries lost 65.97 per cent of their share to India.The same results was obtained by (Sanket and Sekhon 2020) for mango export from India for two sub period (1995-96 to 2005-06) and 2006-07 to 2017-18).

Share of Almonds was very high for Pakistan for the reason that, the hard almonds (stone almonds) and almonds with shell are mostly exported to Pakistan, but in term of value India took the first position by importing almonds (paper almonds (soft almonds) and kernel based almonds) from Afghanistan, which

Table 3. Transitional probability matrix for almonds export from Afghanistan during 2010-11 to 2020-21

Countries	India	Pakistan	Turkey	UAE	Germany	Iran	Iraq	Others
India	0.31000	0.00000	0.00000	0.02024	0.00688	0.00000	0.02408	0.63881
Pakistan	0.00000	0.96931	0.00203	0.01454	0.00000	0.01412	0.00000	0.00000
Turkey	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000
UAE	0.60283	0.00000	0.16699	0.00000	0.23018	0.00000	0.00000	0.00000
Germany	0.70210	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.29790
Iran	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Iraq	0.00000	0.00000	0.83671	0.00000	0.16329	0.00000	0.00000	0.00000
Others	0.65971	0.00381	0.00573	0.00000	0.00000	0.00969	0.00000	0.32107

had high price in international market.These different types almonds exported to India and Pakistan were based on demand of the markets in respective countries, which India had highest demand for Afghan almonds due to highest population, market diversification and consumer preference. From the results it was revealed that remaining countries such as Turkey, UAE, Germany, Iran and Iraq lost their share, Afghanistan depended mostly on two markets India and Pakistan. Hence, there is need to change the export strategies and explore new markets for almonds in others countries as well to reach the export of almonds to global markets. These probabilities reflect historical trends in almond exports from Afghanistan to various countries during the specified time period

Conclusion

Afghanistan almonds had lower nominal protection coefficient value for UAE followed by India and Turkey, in other words, higher price of almonds in the international market than the domestic price showed distinct comparative price advantage in favour of Afghanistan. Afghanistan appears to have consistently held a significant comparative advantage in almond production and exports in the global marketswhich had highest RCA value throughout the period. some countriesshouldimprove their production methods, leading to an increase in their relative advantage over time.Countries with a high comparative advantage can aim to capitalize on it by investing more in almond production, while others might need to evaluate their strategies. This will speculate on potential changes in comparative advantage in the coming years.Pakistan share of Almonds was very high in direction of trade, as hard almonds (stone almonds) and almonds with shell were most exported to Pakistan, while in term of value, India stood first by way importing almonds from Afghanistan, which commanded high price in international market.These different types almonds exported to India and Pakistan were based on demand of the markets in respective countries.

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