International Journal of Foreign Trade and International Business

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Export performance of pistachios from Afghanistan

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Abstract
The present study is attempt to reveal the export performance of pistachios from Afghanistan, The Compound Annual Growth Rate and Cuddy Della Valle Index were employed to analyze the data for the considered period of the study. The secondary data for exports of pistachios to different countries in the context of quantity and value was collected for the period of 2010-11 to 2020-21. The highest average share in term of quantity and value were for India 70.95 and 75.68 percent followed by Turkey 9.88 and 9.77 percent respectively. The growth rate of exports in term of quantity and value were 7.91 and 7.84 percent per annum with their average export of 2069 metric tonnes and 22883.42 thousand US dollars respectively. In case of country wise exports Lebanon registered the highest growth rate 42.28 percent per annum, followed by Turkey and UAE 39.54 and 15.34 percent per annum respectively. The most stable market for pistachios was India with the instability rate of 37.09 percent. Exports to India increased from 886.36 to 1959.52 metric tonnes from the year 2010-11 to 2020-21 with the average exports of 1454.76 metric tonnes. Similarly, in case of value the highest average exports was to India 19025.65 thousand US dollars while, the growth rate was highest for Lebanon 60.90 percent per annum, followed by Turkey and UAE 45.6, 14.72 percent per annum respectively, Afghan pistachios only depending on few regional markets specially India and Pakistan, which exposes greater risk due to market fluctuations, Changes in economic conditions, consumer preferences, regulations, tariffs, trade agreements, government policies and geopolitical tensions in these two markets could have a significant impact on export of pistachios. Therefor there is need for government to diversify the export markets which will provide stability for pistachios exports.

Keywords: Pistachios, Afghanistan, exports, compound annual growth rate and instability

Introduction

The dried fruits and nuts sector has historically been one of Afghanistan's leading categories among agricultural exports. Afghan raisins, in particular, once held a dominant position in world markets prior to Afghanistan being subsumed by warfare in the 1980s. Afghanistan produces a wide array of dried fruits and nuts with many different varieties, with unique tastes that have attracted buyers throughout the region. This sector has played a critical role in the post-2001 reconstruction period, filling out Afghanistan's export basket and setting the foundations for strong export growth in the future.

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.

Unlocking the full potential of Afghanistan's dried fruits and nuts sector will require improvements throughout the cultivating, harvesting and processing stages of production. Following targeted interventions along the value chain, the gains achieved in terms of volume and quality of production outputs have implications beyond boosting exports. Dried fruits and nuts are labor-intensive, with entire households and communities contributing to different activities along the value chain. Women often play a significant role during the

harvesting and processing stages, thereby elevating their status as contributors to household incomes. 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 stakeholders have joined forces to develop this Dried Fruits and Nuts Sector Export.

The average growth rate over the 2001-12 to 2020-21 period was 1.1 million metric tonnes /year, showing the trajectory of production growth seen in the last decade. Almonds and walnuts were the largest crops, accounting for 31 percent and 19 percent of the global share, respectively followed by pistachios 19 percent, cashews 16 percent, and hazelnuts 10 percent. Pecans, macadamia, pine nuts, and Brazil nuts accounted for the remaining 5 percent. While analyzing the annual growth rates of various tree nut crops over the last ten years, it is seen that the macadamia, walnut, pecan, cashew, almond, and pistachio crops had the most important linear increments with the annual growth rates of walnuts 59,082 metric tonnes per annum, almonds 53,885 metric tonnes per annum and pistachios: 42,426 metric tonnes per annum.

Season 2020-2021 was largely an "on year". As a result, global production totaled over 1 million metric tonnes (in shell basis), the highest amount of the last decade, representing a 54 percent increase from the previous year and a 68 percent increase over the previous 10- year average. The United States was the top supplier, accounting for 47 percent of the global share. It was the second "on year" in a row for Iran and Turkey showed a particularly high bumper crop. The United States led the world pistachio in-shell exports in 2019, with 219,155 metric tonnes, 62 percent of the total. The top destinations were China 44 percent of the country share and the European Union + the United Kingdom 34 percent. Iran was the second top exporter of in-shell pistachios, accounting for the following 20 percent of the global share. Iranian exports in 2019 were mostly destined for China 63percent, European countries 16 percent and the Middle-East 12 percent.

Material and Methods
The study on export performance of pistachios from Afghanistan was purposively taken up in all Afghanistan level. The secondary data on export of pistachios were used to analyze the Compound Annual Growth Rate (CAGR) of Afghan pistachios. The time series data for exports of pistachios was available from 2010-11 to 2020-21. The data pertaining to export of pistachios 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 period,

Compound Annual Growth Rate
Compound Growth Rate and Instability will be used for estimating the growth rate and extent of variability in export of pistachios from Afghanistan.

$$Y_t = A b^t V_t \tag{1}$$

Where,
Y_t = Data on area, production and productivity in the year 't'
A = Intercept indicating Y in the base period (t-0)
t = Time period
V_t = Error term
b = (1+g)
g = Average compound growth rate to be estimated

Equation 3.1 was converted into logarithmic form in order to facilitate the use of linear regression.
Taking logarithms on both sides of the equation (3.1)

$$Ln\ Y = ln\ A + t\ (ln\ b) + ln\ V_t$$

This can be written in the following form

$$Q_t = a + bt + V_t \tag{2}$$

Where,
$Q_t = ln\ Y_t$
a = ln A
b = ln B
$V_t = ln\ V_t$

The values of 'a' and 'b' were estimated by using ordinary least squares estimation technique.
Later, the original 'A' and 'B' parameters in equation (3.1) were obtained by taking anti-logarithms of 'a' and 'b' value as
A = anti ln a
B = anti ln b

Average annual compound growth rate was calculated as
$g = (B-1) \times 100$

The significance of the regression coefficient was tested using student 't' test.

Instability
The Linear trend was fitted to the original data of yearly quantity and value of pistachios exported from Afghanistan for the period 2010 – 11 to 2020-21. The trend coefficient was tested for their significant. Whenever the trend of a series was found to be significant, the variation around the trend, rather than variation around the mean was used as an index of instability. The formula suggested by Cuddy and Della (1978) [11] was used to compute the degree of variation around the trend. Hence, it is a better measure to capture instability in agricultural production and prices. A low value of this index indicates low instability in prices and vice-versa. The Cuddy-Della Valle index corrects the CV as:

Cuddy - Della Valle Instability Index
CDVI (%) $= CV \times \sqrt{(1 - \overline{R)^2}}$ Where, *C.V is* the Coefficient of Variation in percent, and R^2 is the coefficient of determination from a time trend regression adjusted for its degrees of freedom.

Results and Discussion
Table1 indicates the country wise exports composition of

pistachios from Afghanistan during the period 2006-07 to 2020-21, including both quantity (in metric tonnes) and value (in US dollars). India, Pakistan, Turkey, UAE, Iran, Lebanon and Iraq are the major distention for Afghanistan pistachios exports and the remaining countries are pooled under the category of others. The quantity and value of pistachio exports to different countries changed over the years. The average quantity and value provide the overall average export quantities and values across all years for each country. The major average share in term of quantity was for India 70.95 percent followed by Turkey 9.88 percent, Pakistan, UAE, Iran, Lebanon and Iraq were 3.64, 3.02, 2.49, 1.68 and 0.68 percent respectively. Similarly, in term of value in India had the major share 75.68 percent followed by Turkey and Pakistan 9.77 and 3.95 percent respectively, remaining countries UAE, Iran, Lebanon and Iraq were 3.34, 2.59, 2.14 and 0.85 percent respectively.

Table 1: Country wise export composition of pistachios from Afghanistan from 2010-11 to 2020-21 Quantity - MT Value- US$

Year	Item (%)	India	Pakistan	Turkey	UAE	Iran	Lebanon	Iraq	Others
2010-11	Quantity	96.84	2.92	0.03	0.02	0.04	0.05	0.03	0.06
	Value	96.86	2.90	0.03	0.02	0.05	0.05	0.03	0.06
2011-12	Quantity	88.53	9.12	0.04	0.05	1.97	0.08	0.10	0.12
	Value	88.44	9.40	0.01	0.01	1.99	0.02	0.10	0.03
2012-13	Quantity	88.43	1.52	1.32	7.06	0.04	0.03	0.23	1.38
	Value	88.46	1.52	1.34	7.09	0.04	0.03	0.23	1.30
2013-14	Quantity	19.65	28.34	26.17	3.48	16.45	1.47	4.32	0.12
	Value	19.10	26.86	28.42	3.97	16.03	1.43	4.15	0.04
2014-15	Quantity	45.08	0.51	40.54	6.57	2.25	3.21	0.06	1.79
	Value	45.91	0.62	36.04	8.33	2.50	4.39	0.07	2.15
2015-16	Quantity	75.79	5.53	0.87	6.92	6.38	4.50	0.01	0.00
	Value	75.24	5.83	0.92	6.57	6.69	4.74	0.00	0.01
2016-17	Quantity	94.73	0.09	2.62	0.07	2.33	0.05	0.06	0.06
	Value	94.68	0.12	2.64	0.07	2.38	0.05	0.02	0.04
2017-18	Quantity	51.13	2.11	3.68	2.45	0.72	1.55	1.60	36.77
	Value	71.42	2.60	8.67	3.04	0.16	2.13	3.28	8.71
2018-19	Quantity	82.94	0.07	3.03	2.11	0.85	2.41	0.44	8.15
	Value	93.13	0.02	2.10	1.56	0.15	2.93	0.05	0.06
2019-20	Quantity	96.60	0.07	0.85	0.04	0.55	1.40	0.08	0.41
	Value	98.48	0.02	0.55	0.03	0.09	0.68	0.09	0.07
2020-21	Quantity	95.90	1.24	1.47	0.51	0.20	0.34	0.05	0.30
	Value	92.36	0.66	1.89	0.49	1.37	2.96	0.07	0.21
Average	Quantity	70.95	3.64	9.88	3.02	2.49	1.68	0.68	7.65
	Value	75.68	3.95	9.77	3.34	2.59	2.14	0.85	1.68

The export value trends largely mirror the quantity trends, with India consistently being the primary destination for Afghan pistachios exports in terms of value. Pakistan, Turkey and Iran also hold relatively notable percentages of export value. The data shows that the Afghan pistachios export market is heavily dominated by India, both in terms of quantity and value. This suggests a strong reliance on the Indian market. There were fluctuations in the value percentages to different destinations over the years, indicating potential changes in demand and market dynamics.

Average export composition for India remains the main market for Afghan pistachios exports in both quantity and value, with a very high average percentage. Pakistan, Turkey, UAE, Iran, and others, makes up a relatively small portion of the export composition in both quantity and value. The provided results indicate that there is a strong dependency on the Indian market for Afghan pistachio exports, with India consistently receiving the majority of exports both in terms of quantity and value. In case of there have been some fluctuations in the percentages of exports to other countries, indicating shifts in demand and market dynamics. Monitoring value percentages to different destinations can provide insights into potential emerging markets and changing demand patterns for Afghan pistachios.

The table 2 indicates the growth and instability of pistachios exports in term of both quantity and value from Afghanistan over the period of 2006-07 to 2020-21. The exports of pistachios quantity from Afghanistan have increased from 538 metric tonnes in the year of 2006-07 to 2043 metric tonnes in the year of 2020-21, while in case of value was 3696 thousand US dollars in the year of 2006-07 raised to 22890 thousand US dollars in the year of 2020-21, The exported quantity of pistachios shows consistent growth, CAGR in term of quantity was 7.91 percent per annum, pistachios registered their annual growth rate at 7.84 percent in term of value, the average export of pistachios was 2069 metric tonnes with their instability index of 43.61 percent in term of quantity and 22883.42 thousand US dollars in term of value with their instability of 37.51 percent. Afghanistan's pistachios exports have shown significant growth over the years. However, the trend and stability of exports varied among different years during the study period. While some years have experienced consistent growth, others have exhibited more fluctuation. The variations could be attributed to factors such as market demand, production levels, and external economic conditions and political instability of the country.

Table 3 shows the trend in export quantity of pistachios from Afghanistan, the major importing countries of pistachios from Afghanistan were India, Pakistan, Turkey, UAE, Iran, Lebanon, Iraq and remaining countries are categorised under others, the table revealed that Lebanon registered the highest growth rate 42.28 percent, followed by Turkey UAE, Iran, India and Iraq at 39.54, 15.34, 14.62,

11.63 and 10.41 percent respectively.

The CDVI values show the degree of diversification in pistachio exports to different countries. Higher values indicate more instability to export destinations, Lower value can contribute to economic stability its need to reduce dependence on a single market.

Table 2: Growth and instability of pistachios exports from Afghanistan from 2006-07 to 2020-21

Year	Quantity in MT	Value in 000 US$
2006-07	538	3696
2007-08	2713	18007
2008-09	3259	24556
2009-10	1969	19902
2010-11	915	14225
2011-12	1067	15440
2012-13	1671	22703
2013-14	1632	22517
2014-15	3604	42007
2015-16	1499	21164
2016-17	1069	12999
2017-18	3750	38121
2018-19	2941	35717
2019-20	2364	29308
2020-21	2043	22890
Total	31034	343251.31
Mean	2069	22883.42
STD	1008	10137.14
R^2	0.86	0.83
CAGR%	7.91	7.84*
CDVI%	43.61	37.51

Source: Afghanistan statistical yearbooks.
Note: * Significant at 5% level.

The most stable market for pistachios was India at the instability rate 37.09 percent. exports to India in the year 2010-11 was 886.36 metric tons and raised to 1959.52 metric tonnes in the year 2020-21 with the average exports of 1454.76 metric tonnes followed by Pakistan and Turkey at 74.74 and 202.63 metric tonnes respectively.

Table 3: Growth and instability of country wise export quantity of pistachios from Afghanistan from 2010-11 to 2020-21 (Quantity in MT)

Year	India	Pakistan	Turkey	UAE	Iran	Lebanon	Iraq	Others
2010-11	886.36	26.75	0.30	0.20	0.40	0.50	0.30	0.51
2011-12	944.60	97.29	0.40	0.50	21.00	0.90	1.02	1.30
2012-13	1477.69	25.35	22.00	118.00	0.60	0.50	3.81	23.05
2013-14	320.72	462.41	427.08	56.85	268.38	24.00	70.49	2.00
2014-15	1624.59	18.49	1461.15	236.62	81.00	115.68	2.00	64.60
2015-16	1136.33	82.88	13.00	103.78	95.65	67.40	0.20	0.04
2016-17	1013.00	1.00	28.00	0.70	24.92	0.50	0.60	0.63
2017-18	1917.00	79.00	138.00	92.00	27.00	58.00	60.00	1378.54
2018-19	2439.00	2.00	89.00	62.00	25.00	71.00	13.00	239.82
2019-20	2283.65	1.58	20.00	1.00	13.00	33.00	2.00	9.72
2020-21	1959.42	25.35	30.00	10.32	4.00	7.00	1.00	6.19
Total	16002.35	822.10	2228.93	681.98	560.95	378.48	154.41	1726.40
Mean	1454.76	74.74	202.63	62.00	51.00	34.41	14.04	156.95
SD	657.22	133.16	435.36	73.52	78.57	38.76	25.68	411.31
R^2	0.79	0.63	0.68	0.53	0.55	0.67	0.53	0.63
CAGR%	11.63*	-24.44	39.54	15.34	14.62	42.28	10.41	38.73
CDVI%	37.09	164.56	204.56	122.96	158.28	101.71	190.15	257.50

Source: Afghanistan statistical yearbooks.
Note: * Significant at 5% level.

The annual export quantities of pistachios to different countries such as India and Pakistan have been significant destinations, while Turkey also receiving notable quantities. The standard deviation values show that some countries like Turkey, UAE, Pakistan, and Iran have experienced notable variations in pistachio export quantities over the years. The R2 values suggest that there is a moderately strong correlation between years and pistachio export quantities to most countries, especially India and Turkey. Turkey and Lebanon had shown particularly high growth rates, while Pakistan had seen decline. The table provides insights into the export dynamics of pistachios from Afghanistan to various countries over a specified period. Its shows that, trade patterns, identifying growth opportunities, and assessing economic stability in the pistachio export sector.

The table 4 presents the trend in selected country wise export value of pistachios from Afghanistan. The growth rate in value of pistachios exported during the study period

to Lebanon was 60.90 percent followed by Turkey, United Arab Emirates and India with 45.6, 14.72, 9.48 percent respectively.

India was the sable market for pistachios with the rate 38.03 percent of cuddy Della valle instability index. exports to India in the year 2020-21 was 13778 thousand US dollars raised to 22064.19 thousand US dollars in the year 2020-21 with average exports 19025.65 thousand US dollars and turkey and Pakistan the average value of 2456.08 and

993.28 thousand US dollars respectively. The results indicate that Afghanistan's pistachio exports have experienced growth over the years, with some variability in export values to different countries. India, Pakistan, and Turkey have remained key markets, while other countries like Iran, Lebanon, and Iraq have also contributed to the export market. The diversification across multiple countries can help mitigate risks associated with dependence on a single market specially India and Pakistan.

Table 4: Growth and instability of country wise export value of pistachios from Afghanistan from 2010-11 to 2020-21 (US$ 1000)

Year	India	Pakistan	Turkey	UAE	Iran	Lebanon	Iraq	Others
2010-11	13778.00	413.00	4.00	3.00	7.50	6.50	4.60	8.40
2011-12	13655.00	1452.00	1.00	2.00	308.00	2.50	15.00	4.50
2012-13	20082.00	345.00	304.00	1609.00	8.13	6.60	53.00	295.27
2013-14	4301.74	6047.00	6400.00	893.00	3610.00	322.00	934.00	9.26
2014-15	19286.00	259.00	15140.00	3498.00	1050.00	1843.00	28.00	902.84
2015-16	15923.00	1233.00	194.00	1391.00	1416.00	1004.00	1.00	2.00
2016-17	12307.00	15.00	343.00	9.40	309.00	7.00	3.00	5.60
2017-18	27225.19	989.53	3303.22	1159.13	62.73	812.10	1250.00	3318.69
2018-19	31799.00	8.00	717.00	533.00	50.00	1000.00	17.00	20.00
2019-20	28860.99	6.99	160.00	7.90	27.00	200.00	25.00	20.02
2020-21	22064.19	157.52	450.71	117.06	327.01	707.35	16.00	50.56
Total	209282.11	10926.03	27016.93	9222.49	7175.38	5911.05	2346.60	4637.15
Mean	19025.65	993.28	2456.08	838.41	652.31	537.37	213.33	421.56
SD	8157.71	1752.23	4644.63	1070.82	1084.60	594.30	440.37	998.24
R^2	0.79	0.85	0.69	0.53	0.51	0.89	0.54	0.63
CAGR%	9.48	-32.92	45.6	14.72	4.90	60.90*	2.96	13.11
CDVI%	38.03	150.31	179.7	132.87	174.75	91.35	217.38	245.87

Note: * Significant at 5% level.

Conclusion

The majority of Afghan pistachio exports, in terms of quantity, have been consistently going to India throughout the years, with percentages as high as 96.84 percent in 2010-11. There have been small variations in the quantity exported to Pakistan, Turkey, and UAE, but their percentages remained relatively low compared to India. India consistently being the primary destination for Afghan pistachios exports in terms of value. Pakistan, Turkey and Iran also hold relatively notable percentages of export value. The data shows that the Afghan pistachios export market is heavily dominated by India, both in terms of quantity and value. This suggests a strong reliance on the Indian market. There were fluctuations in the value percentages to different destinations over the years, indicating potential changes in demand and market dynamics. Average export composition for India remains the main market for Afghan pistachios exports in both quantity and value, with a very high average percentage. Pakistan, Turkey, UAE, Iran, and others, make up a relatively small portion of the export composition in both quantity and value. The provided results indicate that there is a strong dependency on the Indian market for Afghan pistachio exports, with India consistently receiving the majority of exports both in terms of quantity and value. In case of there have been some fluctuations in the percentages of exports to other countries, indicating shifts in demand and market dynamics.

Afghanistan's pistachio exports have experienced growth over the years, with some variability in export values to different countries. India, Pakistan, and Turkey have remained key markets, while other countries like Iran, Lebanon, and Iraq have also contributed to the export markets. The diversification across multiple countries can help mitigate risks associated with dependence on a single

market specially India and Pakistan. Afghan pistachios only depending on just few regional markets specially India and Pakistan for exports, which exposes greater risk due to market fluctuations. Changes in economic conditions, consumer preferences, government policies and geopolitical tensions in these few markets. Relying on only few markets can make the exports vulnerable to sudden disruptions. If one or both of these markets face economic downturns, political unrest or other crises, the export dried fruits could suffer greatly. Relying solely on two markets may limiting the ability to tap into new opportunities in other regions that could offer growth potential for exports of pistachios from Afghanistan. Changes in regulations, tariffs and trade agreements in these two markets could have a significant impact on export of the commodities. Therefor there is need to diversify of export markets which will provide stability and mitigate risks.

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