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Trend analysis of arrivals and prices of coconut in Goa agricultural produce and livestock marketing board, Arlem-Goa

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Abstract
For the present study, the time series secondary data on monthly arrivals and prices of coconut from the year 2010 to 2021 were utilized. The data was collected from the Goa Agricultural Produce Livestock Marketing Board (GAPLMB), Goa, its sub yards and from Ministry of Agriculture and Farmer Welfare, Government of India (https://agmarknet.gov.in/). The data were analyzed with simple statistical tools such as Growth rates, simple average, percentage were used to arrived at meaningful conclusion and fulfilling set objectives. The finding revealed that, for coconut both arrivals and prices have significantly increase over the year by 3.73 and 11.50 percent, respectively. The arrivals of coconut in GAPLMB, Goa did not showed a particular trend but it fluctuate in months, the maximum arrivals was in the month of January (7.31 lakh nuts) and Minimum during the September (3.44 lakh nut) while highest prices was observed in the month of February (8291.67/'000' nuts) and lowest in the month of July (7041.67/'000' nuts). The analysis of trend in prices of coconut in GAPLMB, Goa, revealed that, there was no observation of cyclical and irregular trend in market.

Keywords: Arrivals, prices, coconut, agricultural produce, livestock marketing board

1. Introduction
Agricultural marketing is the study of all the activities, policies, involved in the movement of agricultural produce from the farms to the ultimate consumer. Efficient marketing system plays an important role in welfare as well as economic growth of the country. Regulated market is a key element for the efficient marketing system. Regulated market is controlled by the state government through the market committee, which aims to eliminate the unhealthy and unscrupulous marketing practices and to safe guide the interest of both producer and consumer. Farmers are assisted in making decisions on the future production pattern and sales of agricultural commodities by market intelligence and market news pertaining to market prices and arrivals over time. The primary goal of regulated market is to promote fair trade, provide infrastructural facilities to farmers and facilitating smooth marketing functions by reducing exploitation. With the same aim of the regulating, price stabilizing and to bring development of marketing of agricultural produce and to safeguard the economic interest of the producer and seller in Goa, the government of Goa in the year 1968 extended to his state, the Maharashtra Agriculture Produce Marketing (Regulation) Act 1963 with suitable modifications. The Act was made applicable with effect from 16 September 1968 and Goa Agriculture Produce Marketing rules 1969 were framed and Goa Agricultural Produce Marketing committee was constituted in 1969. Goa APMC was renamed as The Goa Agriculture Produce & Livestock Marketing Board, with its head quarter at Margao in the year 2020. It is the Apex body in the State in consistence with the Model Act of Central Government. There are presently 27 agricultural commodities Notified for regulating in the market area.

1.1 Coconut Scenario in Goa
Goa is a smallest state of India within the coastal region known as Konkan in west. It is being in the tropical zone, the climate of Goa is warm and humid with lateritic soil make it suitable for plantation crops. Coconut and cashew are major plantation crops of Goa along with other crops like arecanut, sugarcane, fruit crops like pineapple, mango banana. The total sown area of state is 14,4381 ha out of which plantation crop have occupied 87,630 ha which is about 60.7 percent of total area.

Paddy being the principal crop in Goa occupied 22.6 percent of total sown area followed by Coconut and Cashew. Around 26,630 ha area was under coconut plantation and some of the plantation crops like areca nut, banana, are intercropped with the coconut plantation which increase the efficiency of resources and generate additional income to the farmers. The area, production and productivity of coconut in Goa is increase by 3.5 percent, 27.4 percent and 23.3 percent respectively over base year 2011-12.

2. Material and Methods

The study was based on trends analysis of arrival and prices of coconut in Goa Agricultural Production and Livestock Marketing Board (GAPLMB) Arlem, Goa was selected purposively. Major plantation crop of Goa *viz.*, coconut was selected for present study. The month wise data in respect of arrival and prices of coconut was collected from the records maintained by GAPLMB, Goa. Based on the availability, the last 12 years data starting from 2010 to 2021 was collected.

2.1 Trends in Arrivals and Prices

The time series data pertaining to monthly arrivals and prices of coconut was collected from Agricultural Production and Livestock Marketing Board, Goa. The compound growth rates of arrivals and prices of coconut and cashewnut was worked out by using an exponential form of equation as below

$Y = ab^t$

Where,
Y = Monthly arrivals/prices
a = Constant
b = Trend coefficient
t = Time period

Annual compound growth rate (CGR) in percentage was calculated as,

CGR (%) = (Antilog of b-1) × 100

2.2 Estimation of cyclical indices

Cyclical movement of time series data on prices was estimated by using residual method.

$$T.C.I. = \frac{T.C.S.I.}{S}$$

Where,
T = Linear trend
C = Cyclical movement
S = Seasonal movement
I = Irregular variation

3. Results and Discussion

3.1 Monthly Average Arrivals and Prices of Coconut (2010-2021)

The average arrivals of coconut were maximum during the month of January (7.31 lakhs nuts) and after that it showed a decline trend up to April. The arrivals of coconut in GAPLMB, Goa did not showed a particular trend but it fluctuate in months, on the contrary to that, the average prices of coconut were almost steady for the months during study period. Highest price was observed in the month of February (8291.67/'000'nuts).

Table 1: Monthly Average Arrivals and Prices of Coconut (2010-2021)

Months	Coconut	
	Arrivals (lakhs nuts)	Prices (₹/000 nuts)
January	7.31	7958.33
February	6.65	8291.67
March	6.15	8208.33
April	4.45	8095.83
May	5.36	7958.33
June	3.87	7666.67
July	3.45	7041.67
August	4.01	7729.17
September	3.44	7729.17
October	5.03	7854.17
November	5.80	7750
December	6.58	7750

3.2 Changes in Arrivals and Prices of Coconut

The change in arrivals and prices of coconut over the base year revealed from the Table 2, the highest arrivals was found in the year 2017 i.e. 81.84 percent higher over the base year, while the lowest arrivals was in the year 2011 which was -17.25 percent. In case of prices of coconut the high prices was observed during the year 2021 which was 249.69 percent higher than base year and lowest in the year 2012. Prices showed the increasing trend over base year**.**

Table 2: Changes in Arrivals and Prices of Coconut

Year	Arrival (lakh nuts)	% change over 2010	Prices (₹/000 nuts)	% change over 2010
2010	49.53	-	4075.00	-
2011	40.98	-17.25	5500.00	34.97
2012	52.93	6.87	3729.17	-8.49
2013	58.42	17.96	4854.17	19.12
2014	47.88	-3.34	7708.33	89.16
2015	64.36	29.94	6770.83	66.16
2016	70.68	42.71	5208.33	27.81
2017	90.06	81.84	10416.70	155.62
2018	72.45	46.27	11375.00	179.14
2019	87.49	76.65	9645.83	136.71
2020	52.84	6.69	10500.00	157.67
2021	57.36	15.81	14250.00	249.69

3.3 Compound Annual Growth Rate of Arrivals and Prices of Coconut

For the period of 2010–2021, the compound annual growth rate (CAGR) of arrivals and prices of coconut was evaluated by fitting an exponential type of equation.

The arrivals and prices of coconut have been increased significantly by 3.73 percent and 11.50 annually over years from 2010 to 2021.

Table 3: Compound Annual Growth Rates of Arrival and Prices of Coconut (2010-2021)

Sr. No.	Crops	Arrivals	Prices
1	Coconut	3.734*	11.504***

(*, ** and *** indicates significance at 10, 5 and 1 percent, respectively)

3.4 Cyclical and irregular trends in prices of Coconut in GAPLMB, Goa

The cycles are the oscillatory movements of the time series with a variable period and amplitude. According to Schumpeter (1939), these cycles are classified as Kondratiet

cycles (period < 60 years), Juglar cycles (period < 10 years) and Kitchincycles (period < 3.3 years). Twelve years seasonalised and detrended data was analyzed to estimate the hidden periodicity along with amplitude in the cycles of coconut in GAPLMB, Goa. The estimated coefficients for coconut was given below in the table.

Table 4: Cyclical and irregular trends in prices of coconut

Year	Coconut	
	Cyclical	Irregular
2011	1.11498	1.20339
2012	0.98033	0.77167
2013	0.92295	0.91309
2014	0.97492	1.19971
2015	0.90441	1.00883
2016	0.89686	0.7038
2017	0.97525	1.17609
2018	1.06415	1.07839
2019	0.984246	0.912268
2020	0.984676	0.921392
2021	1.02807	1.1175

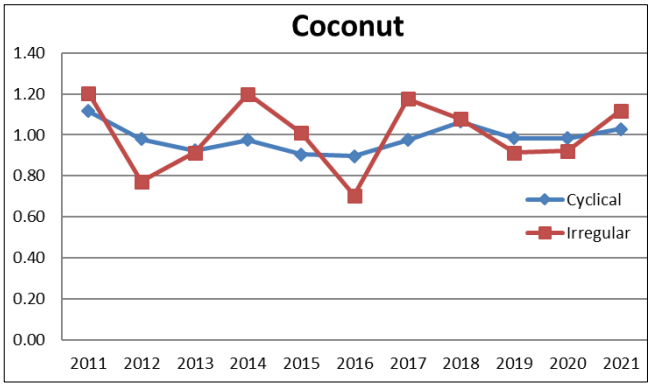

Fig 1: Cyclical and irregular trends in prices of coconut

From the table and figures, it was clear that there were no particular cycle was observed for coconut crop during the study period.

4. Conclusions

1) The arrivals of coconut in GAPLMB, Goa did not showed a particular trend but it fluctuate in months, the maximum arrivals was in the month of January (7.31 lakh nuts) and Minimum during the September (3.44 lakh nut) while highest prices was observed in the month of February (8291.67/'000'nuts) and lowest in the month of July (7041.67/'000' nuts).
2) Low arrivals of coconut were notice in the monsoon season this may be due to difficulty in harvesting in that period.
3) Prices showed the increasing trend over base year. In 2021 the price was highest i.e. 249.69 percent higher over the base year price.
4) The annual compound growth rate shows significant increase in arrivals and prices of coconut by 3.73 percent and 11.50 percent, respectively from 2010 to 2021.

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