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# A Comparative Analysis of Apple Arrival in Selected APM C's of Shimla and Kinnaur Districts

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## ABSTRACT

The present study was conducted at the different market yards of Shimla and Kinnaur District to find the arrival of apples in the different markets. The study will give us an understanding of the changing trends in different markets. For conducting the research data from six years (2014-19) for Apple arrival were collected from the different market yards (Shimla, Chopal, Theog, Kharapathar, Rampur, Rohru, Parala, Narkanda, Nerwaand been analyzed with the help of descriptive and regression analysis which had revealed that the Apple arrival in Shimla market yard is showing low growth trend in comparison to the other market Yards (Parala, Rohru, Kharapathar) which are showing high growth trend. The relative value of the Kharapathar market is the highest, therefore, one can predict that by 2023-24 Apple's arrival in the market will reach 631061 boxes which is very high from the current average of 88571 boxes hence will make it the fastest-growing market yard for Apple selling with the growth rate of 612.49 per cent.


**Key words:** Apples arrival, Average, Elasticity coefficient, Growth rate, Market yards.

**JEL codes:** _C 22, M 31, Q 13.

## INTRODUCTION

The Himachal Pradesh Agricultural and Horticultural Produce Marketing (Development and Regulation) Act, 2005 (Himachal Pradesh State Agricultural Marketing Board). An act to re-enact the law to provide for improved regulation in the marketing of agricultural produce, development of an efficient marketing system, promotion of Agri-processing and agricultural exports, establishment and proper administration of markets for agricultural produce in the State of Himachal Pradesh and ensure level playing field for competitive markets to operate through the setting of minimum standards for facilities, procedures and systems, thereby promoting the establishment of well administered and efficient infrastructure for marketing of agricultural produce in and from the State of Himachal Pradesh. Enforcing the improved regulation of the sale and purchase of agricultural produce brought for sale or purchase in the notified market area/yards. Implementation and arrangement of a better marketing system to provide competitive prices, correct weight and payment and create an exploitation-free atmosphere by stopping illegal activities in the marketing of Agricultural Produce through its Agricultural Produce Market Committees. The Board acts as a liaison agency between the Agricultural Produce Market Committees and the State Government of Himachal Pradesh for the all-round development of the agricultural marketing system in the State (Himachal Pradesh State Agricultural Marketing Board).

APMC (Shimla and Kinnaur) established its administration in 1973 in Dhalli, Shimla. Shimla is an area of pre-eminent vegetation which includes fruits like apples, pear, peach, cherry, almonds, plum, nectarine *etc* and vegetables like peas, potato, cabbage, capsicum, cauliflower, french beans *etc*. The climate condition to grow the above-mentioned crops is adequate due to its location in the southwestern ranges of the Himalayas. However, Kinnaur is situated at a height of 2,320 to 6,816 m (7,612 to 22,362 ft) with long winters from October to May and short summers from June to September. Apple is the principal cash crop of the district with a major production of nuts and dry fruits like Kalazeera, Kuth, Chilgoza and some medicinal and aromatic crops. Ribba village of the district is famous for Chilgoza, which is one of the greatest specialities of Kinnaur. Vegetables include potatoes, peas, cabbage, French beans, capsicum and chillies. Therefore, one can say that APMC under the regulation of the Himachal Pradesh state agricultural Marketing Board and state government plays an essential role in determining fair and competitive prices for the product produced by the farmers and also provide options to the farmer to sell the product at the market yard which is more beneficial to the farmer both from cost and price point of view.

Several studies were conducted by Kumar *et al.* (2005); Patel and Patel (2013); Kumar *et al.* (2014); Muthuraj (2017);

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Gohain *et al.* (2019); Dudhat *et al.* (2021); Deb and Sarkar (2023) and Baruah *et al.* (2023) regarding the behaviour of market arrivals of different crops and variation of prices in different market yards of APMC.

Kumar *et al.* (2005) studied the market arrivals and prices of selected vegetable crops (cabbage, cauliflower, tomato and peas) in metropolitan markets of Delhi, Mumbai, Bangalore and Kolkata and analysed the relationship between market arrivals and prices. The results of the study have confirmed the negative relationship between market arrivals and prices in terms of correlation coefficients over the years and across months in all four metropolitan markets.

Patel and Patel (2013) did a comparative analysis of the performance of the cumin and fennel marketing system in the market at APMC, Unjha. The information on the price and arrivals of cumin and fennel were collected from the APMC of Unjha. A significant relationship between arrivals and prices was studied for both agricultural products. Regression analysis was done for forecasting future values of arrival and their relationship to prices in the agricultural commodities cumin and fennel at APMC.

Kumar *et al.* (2014) conducted a study at six villages of Looni and Falodi tehsil of Jodhpur district of Rajasthan. The study was carried out to ascertain the marketable surplus, sales pattern, market arrivals and prices in the cultivation of cumin crops. It was noted that 63.00% of the cumin produced arrived in the first quarter (March-May) of the year. The arrivals were 17.93%, 8.54% and 10.02% in the second, third and fourth quarters. Farmers got a 10.36% higher price by selling cumin in the second quarter over the post-harvest season (peak season or first quarter). The sale of cumin in the third and fourth quarters of the year was not found to be advantageous. The correlation coefficients between monthly wholesale prices and the arrival of cumin in the corresponding months and the subsequent months were -0.578 and -0.588, showing that there existed an inverse relationship between the two.

Muthuraj (2017) study measured the monthly time-series data on indices of seasonal indices of arrivals and prices of groundnut for the year 2015. I found that the price was the only factor which determined the number of market arrivals in the short run. It was also found that the trend in arrivals and prices was found to be positive over a period.

Gohain *et al.* (2019) analyze the trends in market arrivals and prices of major agricultural commodities (wheat, paddy, maize and cotton) in the markets of Punjab, therefore, it revealed that arrivals of paddy, wheat and maize showed an increasing trend over time whereas arrivals of cotton exhibited a declining trend over time. A positive and high correlation coefficient of market arrivals of wheat, paddy and maize with their corresponding prices indicated an increase in the prices in response to an increase in the market arrivals of these crops.

Dudhat (2021) this study aims to examine the changes in price and arrivals of major oilseeds of APMC, Amreli (Gujarat) analyzing monthly time series data of the last twenty years. The findings that emerged from the study revealed that the month-wise and year-wise highest changes were observed for the groundnut (semi-spreading), followed by sesamum (white). Month-wise severe changes were observed in the price of sesamum (white), while year-wise severe changes were observed for the sesamum (black).

Deb and Sarkar (2023) the study is undertaken in Tripura on a macro framework based on secondary data. This study examines the behaviour of arrivals and prices of potatoes in Tripura. It emerges from this study that there is an inter-year variation in market arrival and prices of potatoes and variability in market arrivals is more pronounced than prices. Arrival remains on the higher side from January to March and consequently, price indices remain low during this period and lower arrival indices coincide with the higher price indices during the lean season in the selected markets. The price indices remain much lower during the period of higher arrival in these selected markets.

Baruah *et al.* (2023) the study was performed to analyse the growth rate and variation (instability) in the arrival and price of potatoes in Assam. The study was conducted for five major markets and five zones of Assam. It was based on secondary data on daily market arrival and daily wholesale price of potatoes collected from www.agmarknet.com for the period 2010-2021. The trend of potato arrival was positively significant in the Hojai market. The study observed that there was a positive growth rate in the arrival of potatoes in almost all of the markets primarily after the harvesting months. The price of potatoes in Barpeta Road, Jorhat and Balugaon markets exhibited a significant positive high growth rate in January. The seasonality index for arrival had been high during the period December-March which is the main season of potatoes in Assam. The instability for arrival and price in Barpeta Road and Balugaon markets were much higher than in the other markets. It is important to have a proper storage facility to minimise the instability.

All the above-given studies are more confined towards the commodity arrival and price variation which tries to reveal the correlation between both however from the current paper one will try to understand the comparative picture of different market yards of APMC from their Apple arrival point of view which will explain the Arrival capacity of different markets and hence reveals the growth and expansion state of different markets which could become a base to suggest the government for making necessary proactive changes (cold storages, Road Network *etc.*) which is a need and required for the upcoming markets with the changing time and is beneficial for the farmers from the future perspective.

## MATERIALS AND METHODS

The study was conducted at the eight market yards (Shimla Bhattakuffar, Theog, Parala, Nerwa Kharapathar, Narkanda, Rohru, Rampur) of Shimla and Kinnaur district from where data for six years (2014-19) of Apple's arrival for different market yards had been collected from the secondary source (APMC Shimla and Kinnaur District). The statistical

techniques that had been used to achieve the objectives of the study:

**Average**

$$X = \frac{\Sigma_{i=1}^{N} X_i}{N}$$

$\Sigma X_i$ = Total sum of apple boxes arrival in all years.
N = Number of years.

$$\text{Standard deveation } \sigma = \sqrt{\frac{\Sigma (x_i - \mu)^2}{N}}$$

**Compound annual growth rate**

The growth rate was specified as the percentage change of a variable within a given time (Saha *et al*., 2020). The compound annual growth rate (CAGR) of the arrival of Apple Boxes for each month was estimated using the following model:

$$CAGR = \left(\frac{V\ final}{V\ begin}\right)^{1/t} - 1$$

CAGR = Compound annual growth rate.
$V_{begin}$ = Beginning value.
$V_{final}$ = Final value.
T = Time in years.

However, it has been observed that simple Tabular analysis based on averages, percentages, CAGR, *etc*., suffers from many limitations as it cannot precisely measure the contribution of a specific factor that is responsible for the change therefore, specialized statistical and econometric tools are applied to the data so that they should provide the desired answer in a required manner. Hence simple linear regression analysis is used to meet the objectives of the present study. After arranging the data into homogeneous categories and working out the averages and percentages linear regression has been used in the present study to work out the elasticities of Apple's arrival every year.

$$Y = a + bx + e$$

Where,
Y = Arrival of apples (Arrival in boxes).
a = Intercept coefficient.
b = Regression coefficient.
x = Time (Year).
e = Error term.

## RESULTS AND DISCUSSION

A market can be a specific place (a meat market, a produce market, a livestock auction), but it need not involve space or occupy a geographical location. It may, for instance, be organized or integrated around the telephone. But there is one thing that always occurs in a market, the thing for which a market is organized is to exchange transfer of ownership. Hence, the market reserves a place or a sphere in which buyers and sellers get together to arrange the sale, to effect transfers of ownership. Agricultural marketing is a process that starts with a decision to produce a saleable farm commodity and it involves all aspects of the market system (functional and institutional), based on pre-and post-harvest operations, assembling, grading, storage, transportation and distribution or marketing. Besides the physical and facilitating functions of transferring the goods from producers to consumers, the marketing system also performs the function of discovering the prices at different stages of marketing and transmitting the price signals in the marketing chain.

Therefore, APMC market yards play a very important role in the Shimla and Kinnaur district area as it dominates the production of various horticulture crops (apple, pear, peach, cherry, almonds, plum, nectarine) and many vegetable crops (peas, potato, cabbage, capsicum, cauliflower, French bean) which not only providing incomes to the farmer's but also deriving the economy of district and states. However, out of all these crops apple production occupies an important position as most of the area resources are allocated to the production of the apple crop, therefore, it becomes important for us to understand the position of different market yards built by the APMC and the arrival status of the apples in the different market yards which will make us aware about the growing situation of the different market yards and hence can become beneficial for the government to frame the agro related policies *e.g*. Building of cold storage, agro-processing unit, road network *etc*.

From Table 1, we will understand the Arrival position of Apples sold in the different market yards of APMC of districts Kinnaur and Shimla.

The market yard of Shimla is located in at the town of Shimla and is one of the oldest market yards of APMC of Shimla and the Kinnaur district. From Table, 1 we found that the average arrival of Apples in the Shimla market yard was 2791217. Boxes per year which was the highest among all the other markets however the CAGR is 7.25 per cent which was the second-lowest in comparison to the other market yards of the Shimla and Kinnaur District.

As far as the regression coefficient is concerned from Fig 1 it had been found 14130 which specifies that with every changing year the arrival of apples in the market had increased by 14130 boxes and on the bases of the coefficient value, one can predict that by 2023-24 arrival of Apples in the Shimla market yard will reach to 2883062 boxes which look close to the current average of 2791217 hence revealing growth rate of 3.29 per cent.

As far as the Market yard of Theog is concerned it had been revealed from Table 1 that the average arrival of apples in the market was1365509 boxes for the last six years and the CAGR is 17.27 per cent which is the third-highest among all the other market yards. However, the regression coefficient is concern was found to be 134455 in Fig 2 which reveals that with every changing year, there is an increase of 134455 boxes in the Theog market yard and on the bases of the coefficient value one can predict that by 2023-24. Apple's arrival in the Theog market will reach 2239468 boxes which looks high as compared to the current average arrival of 1365509 boxes hence revealing a growth rate of 64.00 per cent.

**Table 1:** Apple arrival in Shimla and Kinnaur district markets.

| Market yards | Quantity in number of boxes | | | | | | | | | | Regression coefficient | $R^2$ | Forecasting 2023-24 | Growth % change between average and future forecasting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | Average | Stdev | CAGR (%) | | | | | |
| Fruit mandi bhatta-kuffer | 2439779 | 3484795 | 2911840 | 2298059 | 2151267 | 3461562 | 2791217 | 586722 | 7.25% | | 14130 | 0.002 | 2883062 | 3.29 |
| Theog area | 648452 | 1115000 | 1834000 | 1768200 | 1389022 | 1438382 | 1365509 | 439189 | 17.27% | | 134455 | 0.328 | 2239468 | 64.00 |
| Modern market parala | 0 | 1115617 | 826203 | 1668940 | 1371048 | 2045817 | 1171271 | 713647 | 16.37% | | 338232 | 0.786 | 3369779 | 187.70 |
| Nerwa | 8720 | 9890 | 11580 | 12875 | 11381 | 33699 | 14691 | 9422.73 | 31.04% | | 3733.2 | 0.549 | 38956 | 165.17 |
| Kharapather | 13672 | 16528 | 96600 | 115206 | 119732 | 169688 | 88571 | 61846.5 | 65.49% | | 31666 | 0.917 | 631061 | 612.49 |
| Rohru | 1170548 | 1399097 | 1412737 | 1398867 | 1211652 | 2350041 | 1490490 | 433989 | 14.96% | | 152036 | 0.429 | 2478724 | 66.30 |
| Narkanda area | 1100987 | 2140765 | 2482652 | 2835768 | 2255878 | 2151397 | 2161241 | 581705 | 14.34% | | 170014 | 0.299 | 3266331 | 51.13 |
| Rampur area | 432620 | 540750 | 591897 | 767746 | 620515 | 300 | 492305 | 264652 | -76.65% | | -49899 | 0.124 | 167960 | -65.88 |

As far as the coefficient of determination is concerned it is 0.328, hence 32.00 per cent variation of the dependent variable is explained by the independent variable.

The market yard of Parala is one of the upcoming markets for apple trading and started functioning in 2014-15. The study revealed that the market started with zero apple's arrival in 2014-15 and had reached to 2045817 boxes in 2018-19 with average arrival of 1171271 boxes per year. As far as CAGR is concerned it had shown a growth rate of 16.37 per cent which is the fourth-highest among all the other market yards. The Regression coefficient value of 338232 in Fig 3 specifies that with every changing year, there is an increase in the arrival of Apples in the market with 338232 Boxes. As far as future prediction is concerned from the study it was found that by 2023-24 apple arrival in the Parala market yard will reach 3369779 boxes which looks high from the current average of 1171271 boxes, therefore, showing a growth rate of 187.70 per cent hence is second-fastest-growing market as compare to other market yards.

Fig 3 reveals the 0.786 coefficient of determination which specifies that 78.00 per cent of the variance in the dependent variable is explained by the independent variable.

The Nerwa market yard is located at Chopal block of Shimla district and the study had revealed that the average arrival of apples in the market for a given six years was 14691 boxes with a standard deviation of 9422. As far as CAGR is concerned it is 31.04 per cent and is the second-highest among all the other market yards. However, the regression coefficient value of 3733 in Fig 4 revealed that with every changing year there is an increase of 3733 boxes in the market and by 2023-24 the arrival of apples in the market will reach 38956 boxes which shows a growth rate of 165.17 per cent in comparison to the current average arrival of 14691 boxes, therefore, making it the third fastest-growing market.

As far as the coefficient of determination is concerned it is 0.549 which specifies that 54.00 per cent of the variation in the dependent variable has been explained with the help of the independent variable.

The market yard of Kharapather is located at the Jubbal and Kotkhai block of district Shimla and it had been revealed from the study that the average arrival of apples in the market yard was 88571 boxes for the last six years. The CAGR of the market is 65.00 per cent which is the highest among all the other market yards, however, the Regression coefficient value of 31666 in Fig 5 specifies that with every changing year arrival of Apples is increasing by 31666 boxes and will reach 631061 boxes by 2023-24.

However, the coefficient of determination is 0.917 hence specifying that a 91.00 per cent variation in the dependent variable has been explained.

From the study of Rohru market, it was discovered that the average arrival of apple in the market was 1490490 boxes for the last six years with a deviation of 433989. As far as CAGR is concerned it is 14.96 per cent which is the fifth highest among all the markets and reveals a picture of a new emerging market.

As far as regression co-efficient is concerned Fig 6 revealed the coefficient value of 152036 which specifies that with every changing year, there is an arrival growth of 152036 apple boxes in the market and on the bases of it one can predict that the arrival of apples in the market will reach to 2478724 boxes by 2023-24 hence revealing the growing

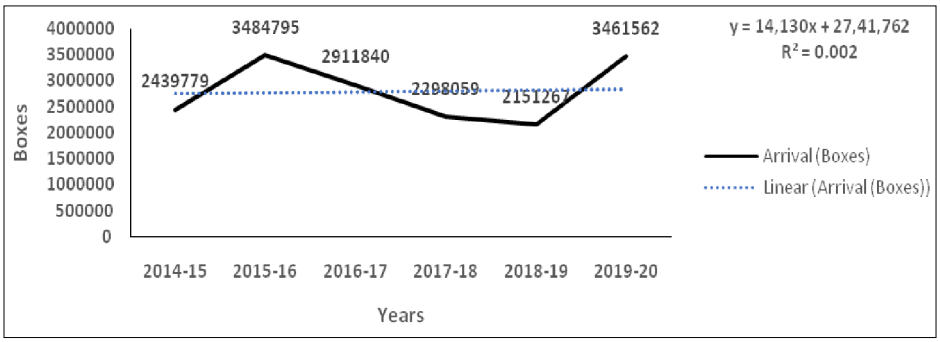



**Fig 1:** Apple boxes arrival at Bhatta-Kuffer market.

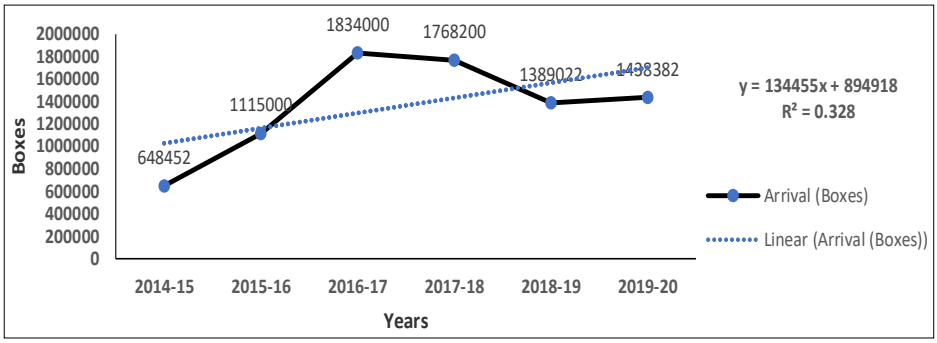



**Fig 2:** Apple boxes arrival at Theog market.

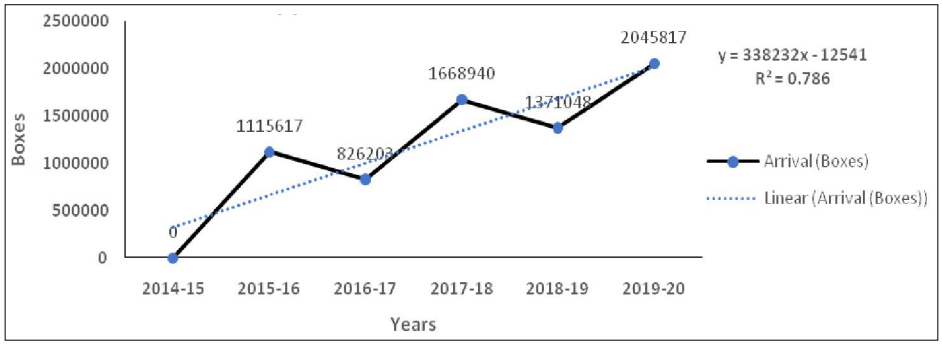



**Fig 3:** Apple boxes arrival at Parala market.

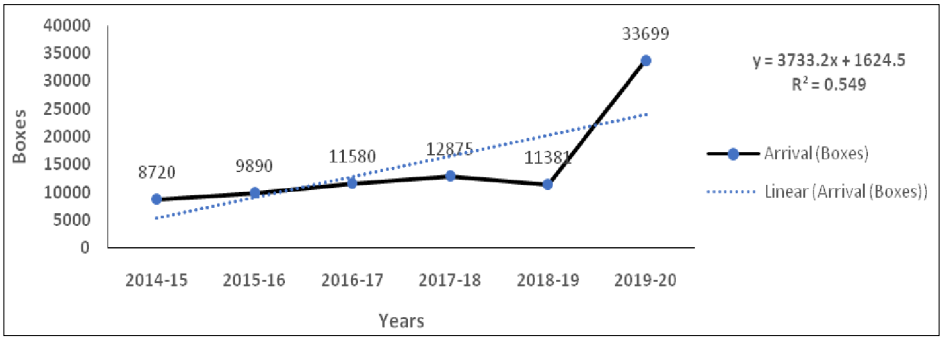



**Fig 4:** Apple boxes arrival at Nerwa market.

rate of 66.30 per cent when comparing it with current Average arrival of 1490490 boxes. As far as the coefficient of determination is concerned it is 0.429 which specifies that a 42.00 per cent variation in the dependent variable has been explained.

The Narkanda market is located at the place which covers the Apple dominating belts *i.e* Kotkghar, Baghi, Karsog, Kinnaur, *etc* hence occupies a very important place, therefore, the study of the market had revealed that the average arrival of Apples in the market for last six years is 2161241 boxes with a standard deviation of 581705 and with CAGR of 14.34 per cent.

However, the elasticity coefficient of 170014 in Fig 7 specifies that with every changing year, there is a growth of 170014 boxes in the market, therefore one can predict that the arrival of apples in the market will reach 3266331 boxes by 2023-24 hence revealing a growing rate of 51.13 per cent when comparing it with current average arrival of 2161241 boxes. As far as the coefficient of determination of 0.299 is concerned it specifies that a 29.00 per cent variation in the dependent variable has been explained by the independent variable.

The Rampur market study revealed that the average annual arrival of apples in the market is 492305 boxes for the last six years and with a CAGR of -76.65 per cent which is the lowest among all the other markets revealing a negative picture of the market.

However, with coefficient value of 49899 in Fig 8 specifies that every changing year arrival is going down by 49889 boxes and therefore, forecasting the arrival of the

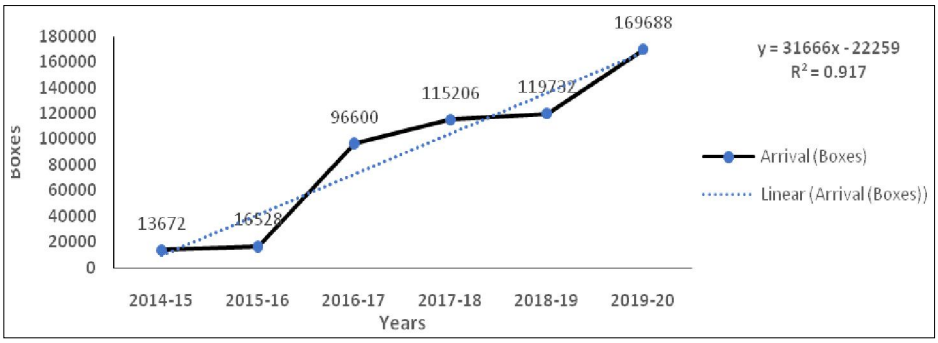



**Fig 5:** Apple boxes arrival at Kharapathar market.

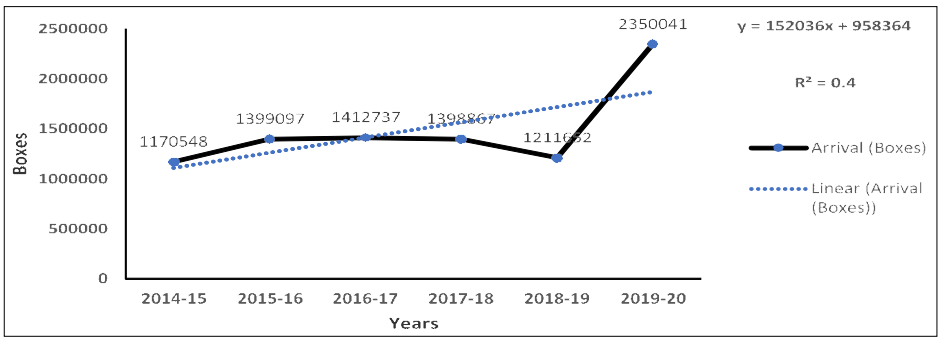



**Fig 6:** Apple boxes arrival at Rohru market.

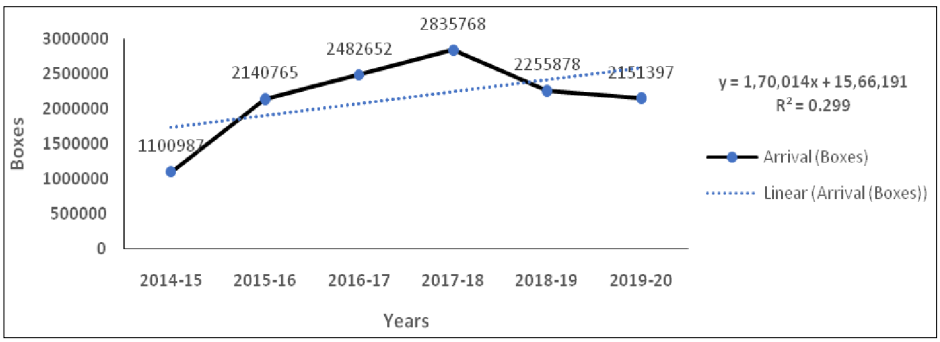



**Fig 7:** Apple boxes arrival at Narkanda market.

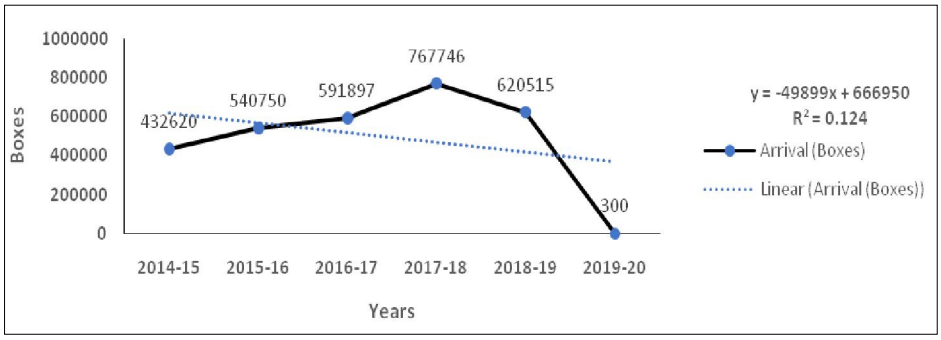



**Fig 8:** Apple boxes arrival at Rampur market.

apple of 167960 boxes by 2023-24 and comparing it with the current average arrival, it is revealing a picture of the negative growth rate of 65.00 per cent and making it low performing market among all the markets.

## CONCLUSION AND POLICY IMPLICATION

The market has a very important role in agriculture production as it not only provides a platform for selling the product but also provides value to the product which otherwise would not be possible for the farmers. The study revealed that every market is showing growth trends except the Rampur market. It was also discovered that Kharapathar, Nerwa and Parala market is coming up as new fast-growing markets among all the other market yards. When one looks towards the performance of the state's oldest market Shimla which is consistently showing trends of slow growth and will come down to the third position by 2023-24 with a growth rate of 3.29 per cent from the current position of the top apple arrival market hence leads us to the policy implication that government should concentrate on providing better infrastructure facilities *e.g.* cold storage, road network, Transport *etc*. to these emerging markets as the arrival pressure in these markets will increase with the time phase and put less pressure on the Shimla market which is situated in town hence creates a big problem on the day to day working activity of the city at a time of apple harvesting season.

### Conflict of interest

All authors declared that there is no conflict of interest.

## REFERENCES

Agricultural Produce Market Committee. (2014-2019). Report on Apple Arrival in Different market yards. Shimla_and Kinnaur.

Baruah, S., Talukdar, U., Sangita, B. and Deka, N. (2023). Arrival and price of potato in Assam: A zonal perspective. Economic Affairs. 68(1): DOI: 10.46852/0424-2513.1.2023.7.

Deb, S. and Sarkar, D. (2023). Market arrival and price behaviour of potato in Tripura, India. Economic Affairs. 68(1): DOI: 10.46852/0424-2513.1.2023.2.

Dudhat, A.S., Yadav, P. and Prajapati, A.P. (2021). Changes in Prices and Arrivals of Major Oilseed Crops in APMC Amreli (Gujarat): An Empirical Analysis. Bhartiya Krishi Anusandhan Patrika. 36(2): 136-140. doi: 10.18805/BKAP331.

Gohain, N., Sukhpal, S. and Bhangu, P.K.S. (2019). Trends in market arrivals and prices of major agricultural commodities in agricultural markets of Punjab. Indian Journal of Economics and Development. 15(1): 150-154.

Kumar, V.V., Kumar, P. and Kumawat, R.C. (2014). Market behaviour, arrivals and price behaviour of cumin in mandor market of Jodhpur District, Rajasthan. Indian Journal of Marketing. 44(2): DOI: 10.17010/ijom/2014/v44/i2/80450.

Kumar, V., Sharma, H.R. and Singh, K. (2005). The behaviour of market arrivals and prices of selected vegetable crops: A study of four metropolitan markets. Agricultural Economics Research Review. 18(2): DOI: 10.22004/ag.econ.58477.

Muthuraj, M. (2017). The behaviour of market arrivals and price of groundnut in Tamil Nadu: An economic analysis. Arthshastra Indian Journal of Economics and Research. 6(4): DOI: 10. 17010/ aijer/2017/v6i4/118157.

Patel, S.A.I. and Patel, J.M. (2013). A comparative study of arrivals and prices of agricultural commodities at APMC using Time Series Analysis. Int. J. Adv. and Innov. Res 2(4): 778-782.

Saha, N., Kar, A., Jha, G.K., Venkatesh, P. and Kumar, P. (2020). Market arrival and price behaviour analysis of potato in four major markets in India. Econ. Aff. 65(4): 529-533.