SYNOPSIS

PRICE VARIATION OF VEGETABLES IN DIFFERENT SEASONS WITH REFERENCE TO ORGANIZED RETAILERS

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In partial fulfillment of the requirements for the award of the degree of

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In
MANAGEMENT

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1. Introduction

After China, India is the second largest in population with various socio economic groups of people. Similar to dialects, their food habits also vary with every kilometer. Vegetables are an essential part of the daily diet in India. They are in great demand round the year from most sections of the population. Globally, 4.9% (2.7 million) deaths annually happen because of low consumption of fruits and vegetables as they are the major source of minerals and vitamins. (Sachdeva et al, 2013).

The vegetables are perishable products under the natural conditions. Due to changing socio-economic scenario of Indian consumers and also change in processing and pattern of trade, the commercial value of vegetables has risen substantially. The average monthly expenditure per capita in India on vegetables was Rs.87.33 (rural) and Rs. 112.44 (urban) which has increased manifold in present time. (NSSO Survey 2009 -10)

Their economic importance has also increased and high labor intensity in the production of most vegetable production also makes them important from the employment angle. (Sharma, 1991)

Increase in area allocation under horticultural crops - suggested as a measure for agricultural diversification, increased employment and income. (Malik, 1998)

In light of these issues, this study seeks to examine the price variations from farmers to organized sector. This topic itself becomes very important as stable price helps both the consumers and farmer. This also helps in economic growth and development of a region/country. The findings of the study may help to provide a better path in terms of quality and price of green vegetables.

It will examine various aspects of vegetable marketing such as market infrastructure, marketing practices, marketing costs, etc. in the wholesale markets in the selected area. The study will further attempt to identify the prevailing value chain from the Farmer → Pre-harvest contractor → Commission Agent → Wholesaler → Retailer → Consumer in terms of costs, prices and their shares in the selected markets.

Prices of vegetables are governed by the law of supply and demand. When the supply of any vegetable exceeds the demand for that product, prices tend to be lower than average. In India perishable product is very sensitive on the price front due to following reasons:

1. Very short shelf - life
2. Local production system
3. Import and export are very limited
4. More over these types of product are consumed locally
5. Very low involvement by the distant consumers
6. Consumers also prefer the local products due to its freshness and quality
7. These products are sensitive to production due to environmental and climate factor.

Vegetables typically constitute an essential part of the daily diet of human beings and they are in great demand round the year from all sections of the population. The commercial value of vegetables in terms of direct consumption, processing as well as trade has risen substantially in recent years. The economic importance has also increased and high labor intensity in the production of most vegetable production also makes them important from the employment perspective. Increase in area allocation under horticultural crops has often been suggested as a measure for agricultural diversification, which increased employment and income in the rural areas.

India is the 4th largest producer of green vegetables after China, there are about 125 cr. people depend on the green vegetables, for their foodstuffs. This is the reason that this sector recognizes the extreme importance not only as a marketing but socially and also politically also. In the previous year, we have noticed different political turmoil and socialization regarding the price issue of the green vegetables. This is very much volatile and there are several factors which determine the price sensitivity of the green vegetables. Due to the absence of a large scale storage system, almost 1/3rd of the green vegetables are wasted and throw away beyond human foodstuffs. This is the most important factor in the price mechanism system. After that we can mention that the proper production system is not applied as per the soil condition and other accessories condition so definitely the production are not matched in according to their estimated capacity. But the line organizational functional systems are there having three strategic points which are:

a. Producer/Farmers

b. Marketer/Intermediaries

c. End consumer

After the observation the researcher found that the producer/farmers are not realizing their perfect profiting condition and they were compel to hand over their production to the vested interested marketing group who has the key capacity to mechanize the pricing system or we can say that this marketer group has the ultimate power in deicing the pricing system of the various products (vegetables). So it is very much a middle man dependant system. On the other hand the consumers are compelled to buy different vegetable products as per their market price. As per the present situation and economic system of a country, there is a hope which has to be considered from the government. The Government is now planning to support this system with exchange commodity with forward system, scientific support as well as developing chain cold stores not only for potato or onion but for all vegetables. We hope that after 2025 the scenario will be chained with the price mechanism management of these products and a fair pricing formula with these products.

The primary focus of this research paper is to know about the challenges and problems of the supply chain of vegetables. The variation in vegetables, arise due to the presence of different intermediaries and distribution level. For this research, the extensive literature review is the base and the concept derived from both the primary and secondary sources. The effort is expected to give an insight into the problems and would attempt to suggest remedial measures for cost optimization and efficiency in the supply chain of vegetables from the producer (farmer) to the consumer. The basic problem lies with a supply chain that hikes the prices of these vegetables. Farmers are not getting requisite realization of price commensurate with their efforts due to lack of storage facilities, poor market information and unorganized faulty supply chain.

There are different vegetables models and literature that exists which support that there is a variation in the price of the vegetables from farm gate to the consumer through the existence of different intermediaries.

This research also states that the farmer does not get the actual value of their vegetables because of the existence of the intermediaries know as Mahajans. These intermediaries negotiate the price from the farmers and buy the vegetables in bulk and then sell those vegetables as per their pricing system, since there is a storage problem and a chance of

waste dump the farmers sell their vegetables as the intermediaries said price, due to which they are unable to charge as per their need and requirement.

On the other hand, the farmers have a proper marketing channel through which they can communicate with their customers like retailers.

Many of farmers produce the vegetables and come to sell in the market, but not able to sell directly in a single day of operation due to which they have to take back the balance vegetable along with them which results more cost in terms of transportation or damage of the vegetables. Therefore, every farmer wants to sell their vegetables in the same day of operation whether in good price or an average price. Thus, with this an intermediary takes advantage and maximizes their margin instead of giving the value price to the farmers.

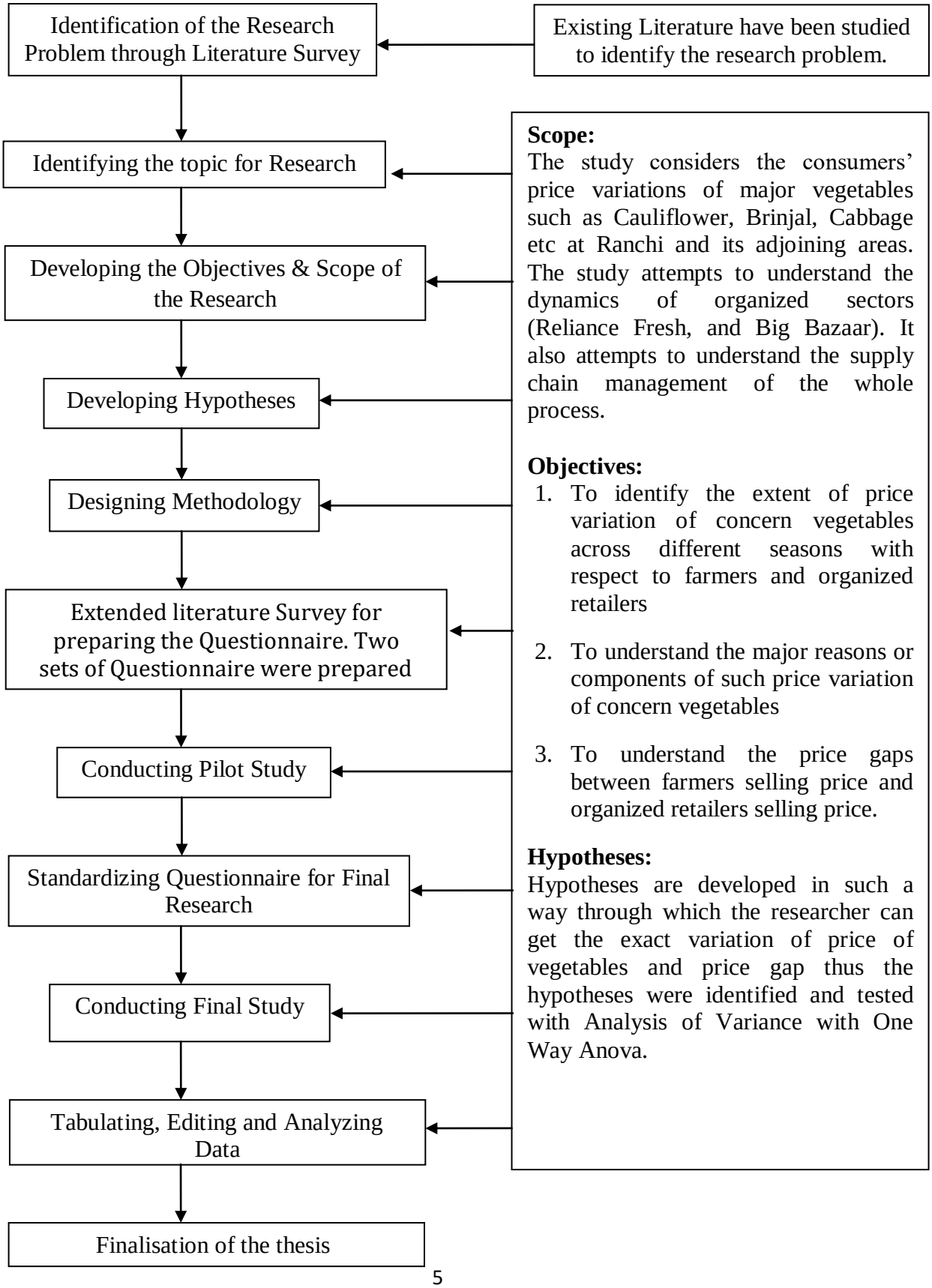
Due to the existence of these channel end-users have to pay more for these vegetables in every season whether it is pre-monsoon, monsoon or post-monsoon.

To overcome with this problem, it is revealed from the study that many of the farmers who do not want to invest so much of cost in production they simply give their some portion of land into contract farming and lease, the rest they keep for themselves and cultivate the limited amount of the vegetables which are later on sold to the specific Mandi and from there the farmers can earn more as compared to other.

2. Research Motivation

My motivation of the research is to get knowledge and provide a remedial measure to the farmers so that the farmers can get the best value for their vegetable production along with the best end user price.

Research Design



3. Contributions from survey of Existing Literature

In this study six vegetables are considered regarding the price variation from farm gate to consumer through different intermediaries like middlemen, wholesaler, and organized retailers, especially the organized retailers.

In this context, it is important to examine the actual cost of production, total land for cultivation, the various agricultural inputs and the selling price of the vegetables from the farmers end and on the other side numbers of intermediaries that exist in the process of supply chain and marketing of vegetables through which the organized retailers get in touch for procuring of these vegetables.

The various variables are considered as well as asked from the farmers/vegetable growers that are directly related to the price variation.

The age, gender, household income, education, social class, etc are the important factors that have to be considered. Environmental affect, cultivation knowledge and various agricultural inputs, various intermediaries play a significant role in price variation of the selected vegetables.

Also, it was said that the vegetables growers get a less price for their produce as compared to the market price of the same vegetables.

From the reviewed literature, it was found that there is a variation in the price of the vegetables from one end to another. Also, the various business model and value chain of the vegetables shows there is an existence of various intermediaries who not only hike the price of the vegetables, but also plays an important role in price fixation of the vegetables in the Ranchi market.

4. Research Gaps

a) Lack of proper local level management regarding the marketing and storage of the vegetables.
b) Lack of awareness among farmer regarding storage system of the perishable product.
c) Local level wastage is extremely high, so prices are unstable and it depends as a seasonal and it is dependent on the season.

d) The vegetables are still not considered as a profitable farming, although the scenario is changing very fast.
e) In Jharkhand despite of good production of the different vegetables there exist most unstable prices.

5. Research Problem

In order to understand the price variation of vegetables it is necessary to know the factors which influence the price of vegetables. It is identified that the various types of retailers that deals with vegetables in Ranchi market also play a vital role in price variation. This study also focuses on the process of procurement or supply chain mechanism of green vegetables by different retailers and its costs.

Due to the perishable nature of products, Over-production and short production cause, extreme price fluctuations of vegetables are there which ultimately affects consumer price.

There is no minimum support price like policy from the government; farmers are affected heavily due to any unfavorable and unpredicted situation. This also affects the consumer price.

The majority of vegetable retail marketing is limited to the unorganized sector; it affects the consumer price stability. The Co-operative marketing policy is not present in this area, which ultimately unstable the consumer price. Cooperative farming is not present in this area; it increases the production price and affects the consumer price. The Adjoining territory of Ranchi considered the highest vegetable producing area of Jharkhand but still the cold storage facility is very negligible. It affects the price of the end consumer. Logistic & Transportation facility is not so much advanced, which also affects the consumer price. Vegetable processing industries are absent in these areas, it ultimately increase the price. Banking and Micro-financing facilities are not up to the mark, it's ultimately effect the consumer price. The Agricultural Insurance facility is not very much aware or applies by the farmer, due to crop loss in a natural calamity, ultimately increases the consumer price.

Direct selling to the consumer is nearly absent, middlemen are involved in the selling process, and it's also increase the price for the consumer. Trained labour force is not

available in this area, it's ultimately effects the production of vegetables and increase the consumer price. Composite farming is also not in practice, it's ultimately increase the consumer price. Organic farming is not available or very negligible, the result is attracting quality and health conscious consumer to buy the crops at higher prices.

6. Research Objectives and Research Hypothesis

Research Objectives have evolved from research problem statements, research gaps have been developed for this research, after an in-depth study of the domain and review of literature.

In the finalization of the research objectives, due consideration has been taken to critically examine the cost and the actual price variation of concerned green vegetables.

The research study was taken up in Ranchi districts of Jharkhand, In view of highest volume of production of the selected vegetables in this district. Due to large scale marketing activity taking place in relation to these vegetables in Ranchi district and in its adjoining areas, as they are endowed with relatively highest areas under respective vegetable. The Vegetables included in the present study were Cauliflower, Tomato, Cabbage, Brinjal, and Beans. For the study there are various objectives which are needed to be analyzed for the final result, so the research objectives have been developed accordingly which as follows:

1. To identify the extent of price variation of concern vegetables across different seasons with respect to farmers and organized retailers
2. To understand the major reasons or components of such price variation of concern vegetables
3. To understand the price gaps between farmers selling price and organized retailers selling price.

Research Hypotheses

In order to achieve the objective a set of hypotheses has been formulated which will be tested and conclusion will be drawn on the basis of the test result. The hypotheses are:

In order to achieve the desired result, a hypotheses have been formulated, which will be tested and conclusions will be drawn on the basis of the test results. The hypotheses are mentioned below:

H_1: There is a variation in average productivity of vegetables at different seasons.

H_{1a}: There is a variation in average productivity of Cauliflower at different seasons.

H_{1b}: There is a variation in average productivity of Cabbage at different seasons.

H_{1c}: There is a variation in average productivity of Beans at different seasons.

H_{1d}: There is a variation in average productivity of Bottle Gourd at different seasons.

H_{1e}: There is a variation in average productivity of Tomato at different seasons.

H_{1f}: There is a variation in average productivity of Brinjal at different seasons.

H_2: There is a variation in average production cost of vegetables at different seasons.

H_{2a}: There is a variation in average production cost of Cauliflower at different seasons.

H_{2b}: There is a variation in average production cost of Cabbage at different seasons.

H_{2c}: There is a variation in average production cost of Beans at different seasons.

H_{2d}: There is a variation in average production cost of Bottle Gourd at different seasons.

H_{2e}: There is a variation in average production cost of Tomato at different seasons.

H_{2f}: There is a variation in average production cost of Brinjal at different seasons.

H_3: There is a variation in average transportation cost of vegetables at different seasons.

H_{3a}: There is a variation in average transportation cost of Cauliflower at different seasons.

H_{3b}: There is a variation in average transportation cost of Cabbage at different seasons.

H_{3c}: There is a variation in average transportation cost of Beans at different seasons.

H_{3d}: There is a variation in average transportation cost of Bottle Gourd at different seasons.

H_{3e}: There is a variation in average transportation cost of Tomato at different seasons.

H_{3f}: There is a variation in average transportation cost of Brinjal at different seasons.

H_4: There is a variation in average packaging cost of vegetables at different seasons.

H_{4a}: There is a variation in average packaging cost of Cauliflower at different seasons.

H_{4b}: There is a variation in average packaging cost of Cabbage at different seasons.

H_{4c}: There is a variation in average packaging cost of Beans at different seasons.

H_{4d}: There is a variation in average packaging cost of Bottle Gourd at different seasons.

7. Scope of Research

It is understood that the number of organized retailers in various sectors is going to increase because of ease in shopping, better ambience, better assortment and great experiences. This study of price variation has good scope to understand the following areas for future strategic decisions by different stakeholders:

- The research tries to explore the price variation of vegetables in Ranchi district with reference to organized retail stores.
- The identification of various important factors which have an impact on variation regarding the price of the vegetables in different seasons.
- This research also helps to understand the various cost components in farming the possibility to reduce the farmers cost burden.
- The research also tries to identify, evaluate and understand the overall dynamics of price variation from farmers to consumers.

8. Data Collection and Methodology

This research uses a random sampling method is used. With the help of this method the overall purpose of the study, and the research questions were identified. The survey questionnaire is divided into two segments, one is for the vegetable growers i.e. farmers and the other part is for the organized retailers. In the first segment the farmers were interviewed in both individual forms as well as in a group form, so that exact conclusion can be drawn regarding the price variation and the problems that are faced by the farmers. In the first segment the farmers were asked regarding the total land, various agricultural inputs used, how they channelized their process for selling and marketing of the vegetables, how much vegetables they grow in the specific season, is there any post-harvest losses, etc., whereas on the second segment the organized retailer were questionnaire regarding how they procure the vegetables, medium of storage, cost like transportation, reprocessing, merchandising or packaging etc.

The data are collected and then analyzed to know the actual variation of the price of the vegetables.

9. Data Analysis

The data were first presented in a tabular form representing the different responses given by the respondents. As per the observation recorded at the time of the data survey, there is a price variation and price gap between the farmers and the retailers. The variation is also between the intermediaries so the analysis of variance with one way Anova was done to compare the variation between the seasons regarding the production, production cost, transportation cost and packaging cost.

9.1 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for concerned vegetables.

9.1.1 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Cauliflower.

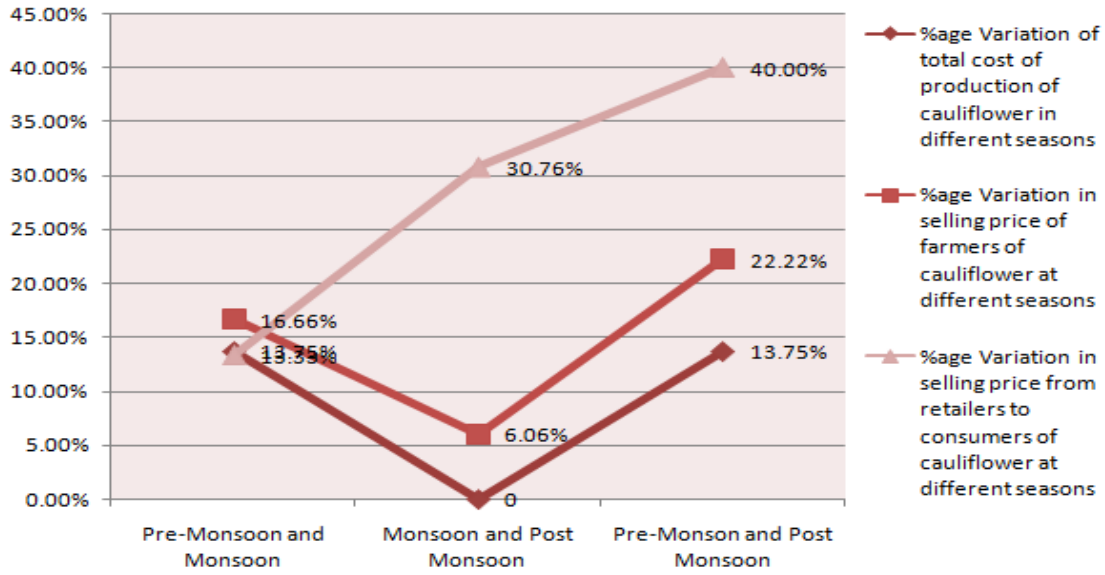


Figure 9.1.1 Price variations in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Cauliflower

The average percentage variation of total cost of production of cauliflower was found 13.75% in pre monsoon and monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 13.35%. In monsoon and post monsoon seasons the percentage of variation is nil, which means there is no variation in total cost of production in these seasons.

The average percentage variation in selling price of cauliflower form farmers was found 22.22% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 13.35%. In monsoon and post monsoon seasons the percentage of variation is minimum as compared to other season which is 6.06%.

The average percentage variation in selling price of organized retailers for cauliflower was found 40.00% in pre monsoon and post monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 30.76%. In pre monsoon and monsoon seasons the percentage of variation is 13.35% which means these seasons have less variation than other seasons.

9.1.2 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Cabbage.

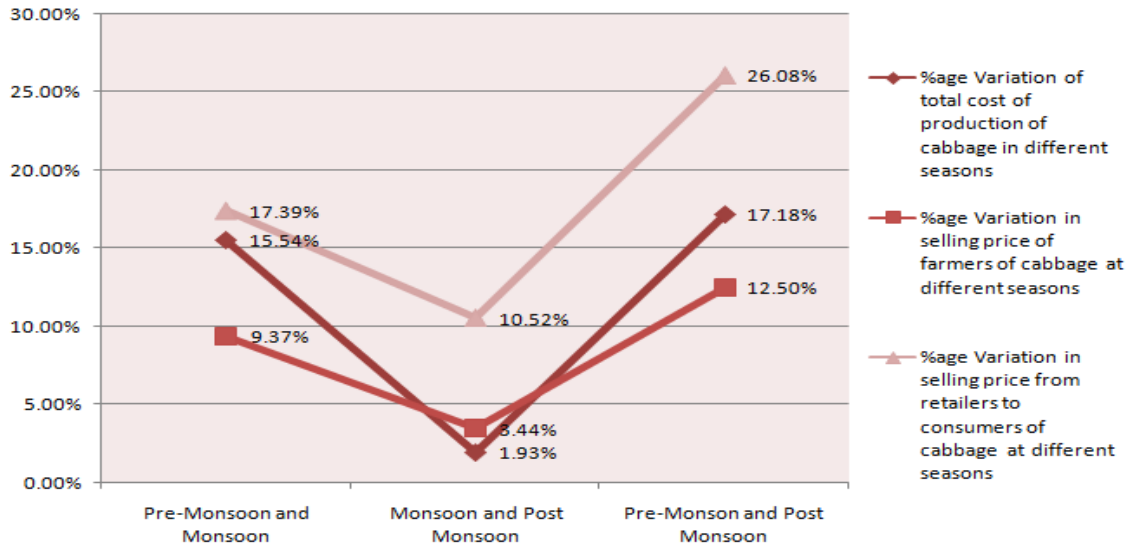


Figure 9.1.2 Price variation in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Cabbage

The average percentage variation of total cost of production of cabbage was found 17.18% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 15.54%. In monsoon and post monsoon seasons the percentage of variation is 1.93% which means there is less variation in total cost of production in these seasons.

The average percentage variation in selling price of cabbage form farmers was found 12.50% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 9.37%. In monsoon and post monsoon seasons the percentage of variation is minimum as compared to other season which is 3.44%.

The average percentage variation in selling price of organized retailers for cabbage was found 26.08% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 17.39%. In monsoon and post monsoon seasons the percentage of variation is 10.52% which means these seasons have less variation than other seasons.

9.1.3 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Beans.

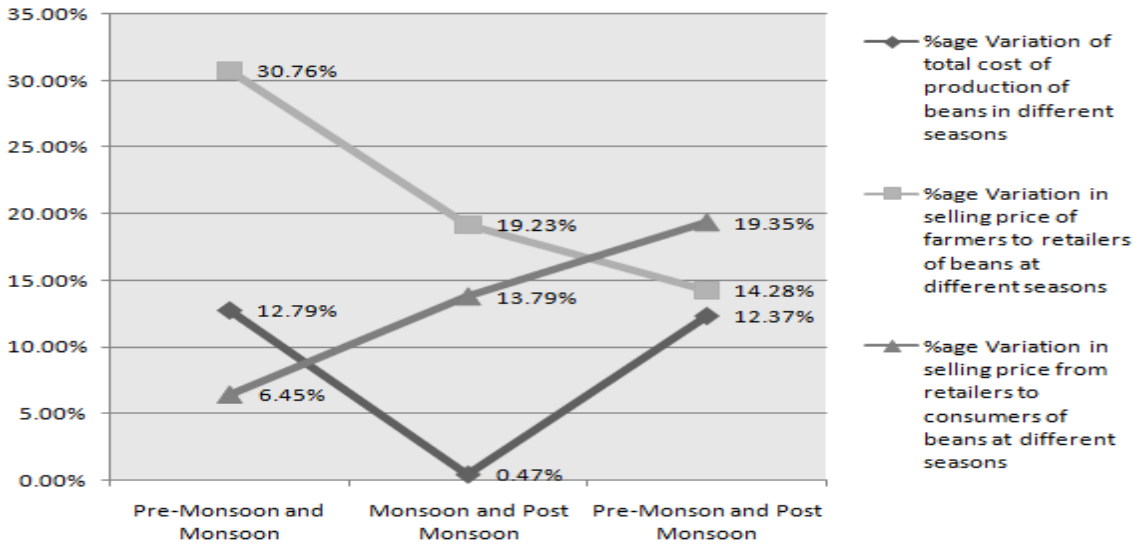


Figure 9.1.3 Price variation in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Beans

The average percentage variation of total cost of production of beans was found 12.79% in pre monsoon and monsoon seasons, which is highest as compared to pre monsoon and post monsoon seasons i.e. 12.37%. In monsoon and post monsoon seasons the percentage of variation is 0.47% which means there is minimum variation in total cost of production in these seasons as compared to other seasons.

The average percentage variation in selling price of beans from farmers was found 30.76% in pre monsoon and monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 19.23%. In pre monsoon and post monsoon seasons the percentage of variation is minimum as compared to other season which is 14.28%.

The average percentage variation in selling price of organized retailers for beans was found 19.35% in pre monsoon and post monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 13.79%. In pre monsoon and monsoon seasons the percentage of variation is 6.45%, which means these seasons have less variation than other seasons.

9.1.4 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Bottle Gourd.

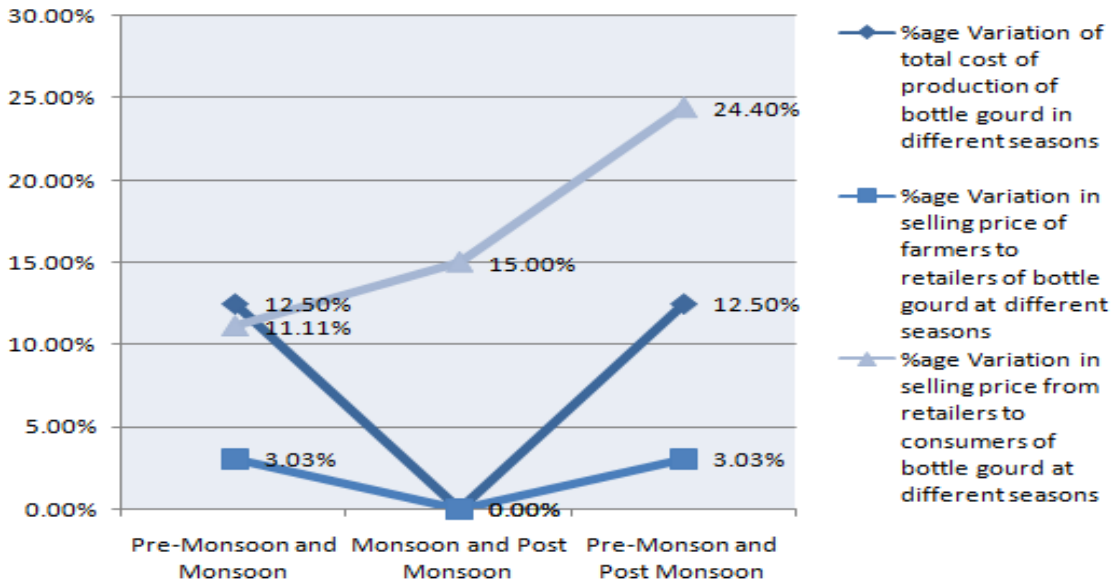


Figure 9.1.4 Price variation in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Bottle Gourd

The average percentage variation of total cost of production of Bottle gourd was found same at pre monsoon and monsoon seasons, and pre monsoon and post monsoon seasons i.e. 3.03%. In monsoon and post monsoon seasons the percentage of variation is nil, which means there is no variation in total cost of production in these seasons.

The average percentage variation in selling price of Bottle Gourd from farmers was found 12.50% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 11.11%. In monsoon and post monsoon seasons the percentage of variation is minimum is nil, which means there is no variation in farmers selling price to retailers i.e. 0.00%.

The average percentage variation in selling price of organized retailers for Bottle Gourd was found 24.40% in pre monsoon and post monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 15.00%. In pre monsoon and monsoon seasons the percentage of variation is 12.50% which means these seasons have less variation than other seasons.

9.1.5 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Tomato.

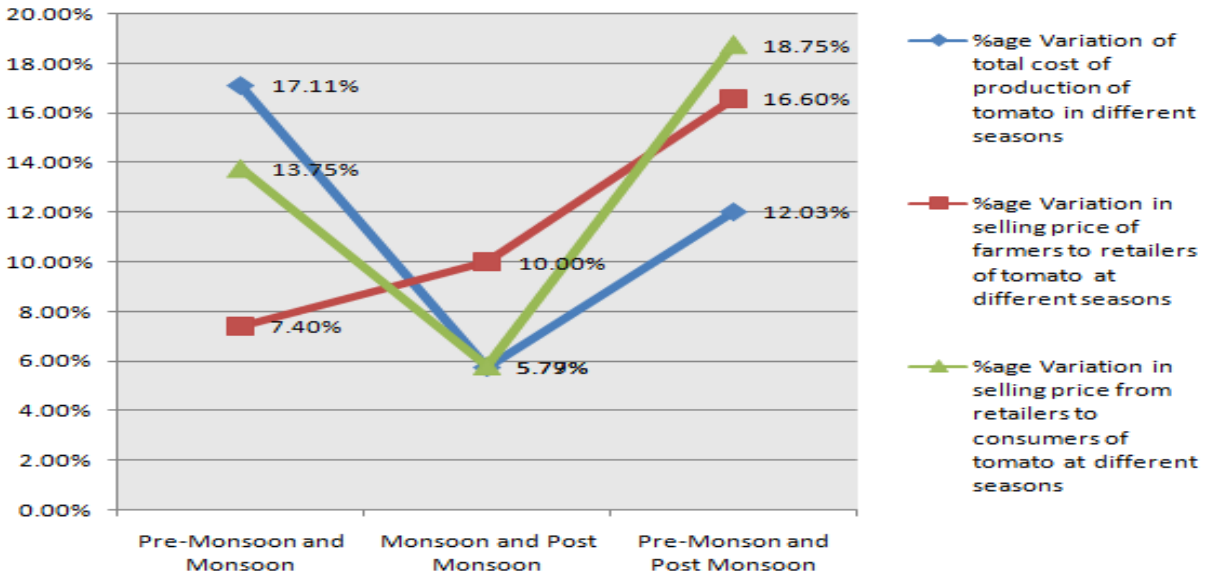


Figure 9.1.5 Price variation in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Tomato

The average percentage variation of total cost of production of Tomato was found 17.11% in pre monsoon and monsoon seasons, which is highest as compared to pre monsoon and post monsoon seasons i.e. 12.03%. In monsoon and post monsoon seasons the percentage of variation is 5.79% which means there is less variation in total cost of production in these seasons as compared to other.

The average percentage variation in selling price of Tomato form farmers was found 16.60% in pre monsoon and post monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 10.00%. In pre monsoon and monsoon seasons the percentage of variation is minimum as compared to other season which is 7.40%.

The average percentage variation in selling price of organized retailers for Tomato was found 18.75% in pre monsoon and post monsoon seasons, which is highest as compared to Pre monsoon and monsoon seasons i.e. 13.75%. In monsoon and post monsoon seasons the percentage of variation is 5.79% which means these seasons have less variation than other seasons.

9.1.6 Percentage of Price variation between two seasons regarding total cost of production, selling price from the farmers to the retailers, selling price from retailers to consumers for Brinjal.

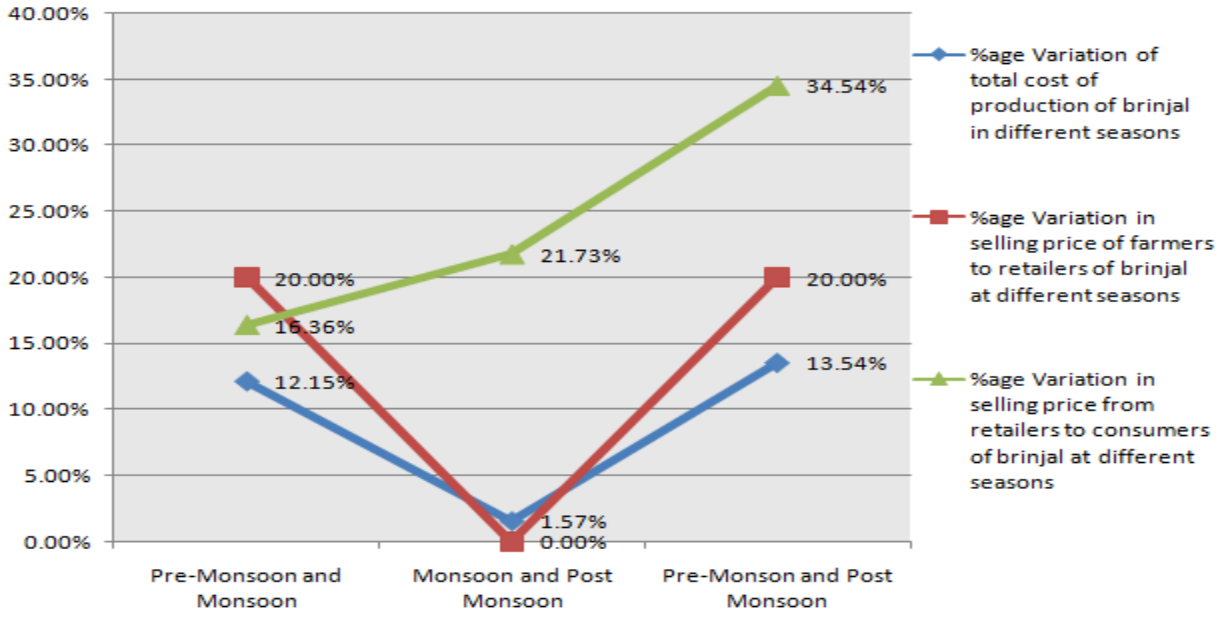


Figure 9.1.6 Price variation in respect to the total cost of production, farmers selling price, and retailers selling between two different seasons for Brinjal

The average percentage variation of total cost of production of Brinjal was found 13.54% in pre monsoon and post monsoon seasons, which is highest as compared to pre monsoon and monsoon seasons i.e. 12.15%. In monsoon and post monsoon seasons the percentage of variation is less as compared to other season i.e.1.57%.

The average percentage variation in selling price of Brinjal form farmers was found same in pre monsoon and post monsoon seasons, and pre monsoon and monsoon season i.e. 20.00%. In monsoon and post monsoon seasons the percentage of variation is nil as compared to other season.

The average percentage variation in selling price of organized retailers for Brinjal was found 34.54% in pre monsoon and post monsoon seasons, which is highest as compared to monsoon and post monsoon seasons i.e. 21.73%. In pre monsoon and monsoon seasons the percentage of variation is 16.36% which means these seasons have less variation than other seasons.

9.2 Price variation of all concerned vegetables in different seasons

For all concerned vegetables

Table 9.2 The total cost incurred by the farmer, farmers selling price, consumer price and price variation of concerned vegetables at different seasons.

Vegetables	Seasons	Cost from the farmers Side				Farmers Selling Price in Rs./Tons	Consumer Price in Rs./Tons	Price variation of vegetables in Rs./Tons
		Production cost in Rs./Tons	Transportation cost in Rs./Tons	Packaging cost in Rs./Tons	Total Cost in Rs./Tons			
Cauliflower	Pre-Monson	12875	3125	0	16000	18000	30000	12000
	Monsoon	10675	3125	0	13800	15000	26000	11000
	Post-Monsoon	10137	3125	0	13800	14000	18000	4000
Cabbage	Pre-Monson	10625	3125	0.00	13750	16000	23000	7000
	Monsoon	8487	3125	0.00	11612	14500	19000	4500
	Post-Monsoon	8262	3125.00	0.00	11387	14000	17000	3000.00
Beans	Pre-Monson	8625	3125	270	12020	18000	62000	44000
	Monsoon	7087	3125	270	10482	26000	58000	32000
	Post-Monsoon	7137	3125	270	10532	21000	50000	29000
Bottle gourd	Pre-Monson	9875	3125	1000	14000	16500	45000	28500
	Monsoon	7962	3125	1000	16000	16000	40000	24000
	Post-Monsoon	7462	3125	1000	16000	16000	34000	18000
Tomato	Pre-Monson	15050	3125	2500	20675	25000	80000	55000
	Monsoon	11512	3125	2500	17137	27000	69000	42000
	Post-Monsoon	12562	3125	2500	18187	30000	65000	35000
Brinjal	Pre-Monson	9375	3125	150	12650	15000	55000	40000
	Monsoon	7837	3125	150	11112	12000	46000	34000
	Post-Monsoon	7662	3125	150	10937	12000	36000	24000

Source: Primary Data (Field Data)

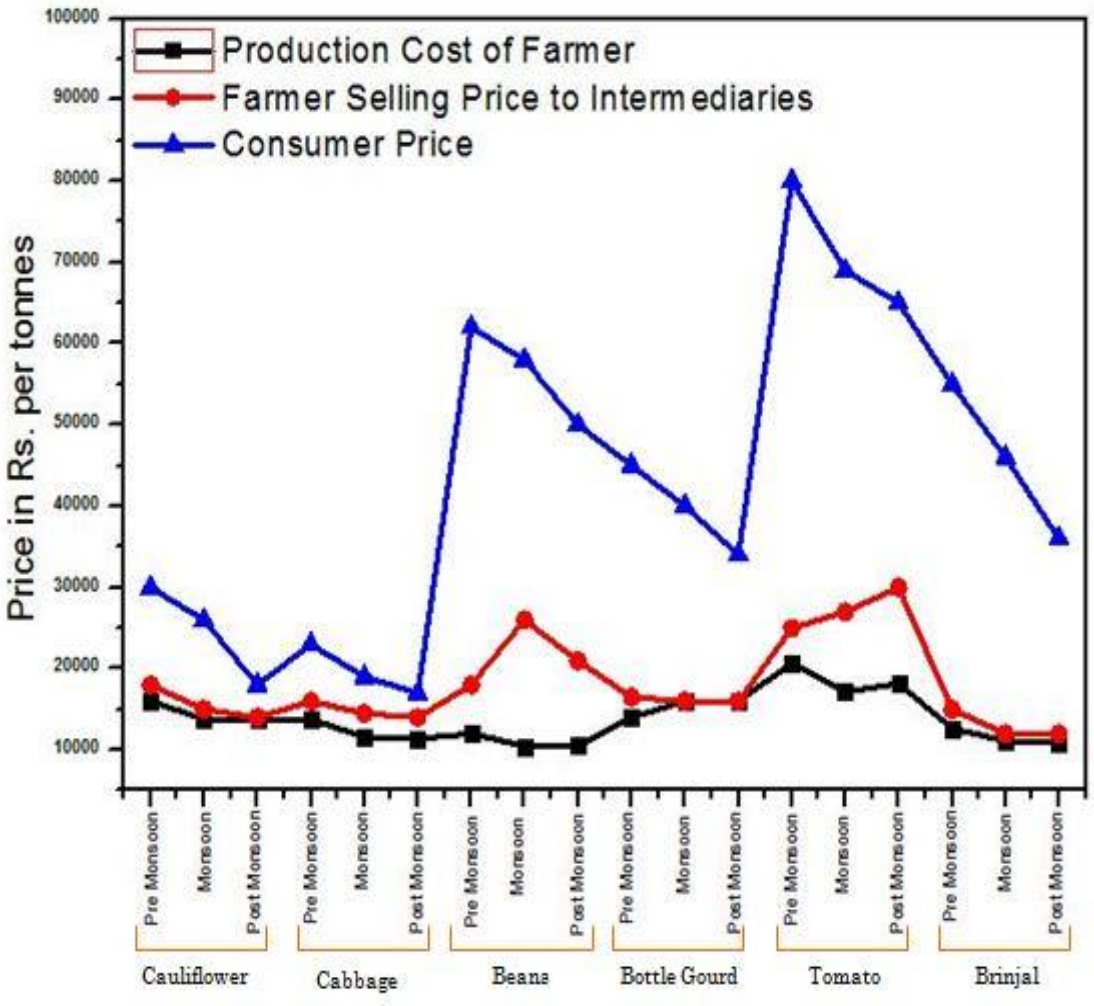


Figure 9.2 Price variations of concerned vegetables in different season

Interpretation

The table 9.2 and figure 9.2 states that there is a variation in price of selected vegetables. There is a maximum variation regarding Tomato, Brinjal, Beans and Bottle Gourd. The farmers does not get appropriate vale for their produce vegetables. Due to lack of storage they can't be able to hold back these vegetables with them for a long period of time after the cultivation because of its perishability in nature, so they have to sell within a particular period of time at the intermediary's price. The result the farmer does not get proper value and intermediaries like mahajans earn more than the farmers. These intermediaries also play a vital role in fixing the price of the vegetables and sell in the market or to the retailers as their convenient.

9.3 Anova was carried out to find the price variation in Average productivity of vegetables in different seasons (Pre Monsoon, Monsoon and Post Monsoon).

Test for Hypothesis H_1 - There is a variation in the average productivity vegetables in different seasons.

H_{1a}: There is a variation in the average productivity of Cauliflower in different seasons.

Descriptive Statistics

Table 4.11 Average productivity of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	0.28	0.1527
Monsoon	0.52	0.2738
Post-Monsoon	0.60	0.3785

ANOVA

Table 4.12 Average productivity of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between the seasons	1.387	2	0.693	8.607	0.000
Within seasons	5.800	137	0.081		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 0.280, S.D = 0.1527), Monsoon (M = 0.52, S.D = 0.2738) and in Post-Monsoon (M = 0.60, S.D = 0.3785).

The analysis of variance table depicts, the value of F = 8.607 and the sig. value is 0.000, for the average productivity of Cauliflower in tons in different seasons.

The analysis of variance states that the average productivity of Cauliflower was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and post monsoon seasons was significantly higher than a pre monsoon season.

For Cauliflower, it has been inferred that the total production is showing an increment of 15.38% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 46.15% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of cauliflower in different seasons.

H_{1b}: There is a variation in the average productivity of Cabbage in different seasons.

Descriptive Statistics

Table 4.13Average productivity of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	0.56	0.3937
Monsoon	0.88	0.4272
Post-Monsoon	0.96	0.4153

ANOVA

Table 4.14 Average productivity of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between the seasons	2.240	2	1.120	6.588	0.002
Within seasons	12.240	137	0.170		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 0.56, S.D = 0.3937), Monsoon (M = 0.88, S.D = 0.4272) and in Post-Monsoon (M = 0.96, S.D = 0.4153).

The analysis of variance table depicts, the value of F = 6.588 and the sig. value is 0.002, for the average productivity of Cabbage in tons in different seasons.

The analysis of variance states that the average productivity of Cabbage was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Cabbage, it has been inferred that the total production is showing an increment of 36.36% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 09.09% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of cauliflower in different seasons.

H_{1c}: There is a variation in the average productivity of Beans in different seasons.

Descriptive Statistics

Table 4.15 Average productivity of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	0.04	0.0178
Monsoon	0.20	0.0957
Post-Monsoon	0.24	0.1118

ANOVA

Table 4.16 Average productivity of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	0.560	2	0.280	38.211	0.000
Within seasons	0.528	137	0.007		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 0.04, S.D = 0. 0.0178), Monsoon (M = 0.20, S.D = 0.0957) and in Post-Monsoon (M = 0.24, S.D = 0.1118).

The analysis of variance table depicts, the value of F = 38.221 and the sig. value is 0.000, for the average productivity of Beans in tons in different seasons.

The analysis of variance states that the average productivity of Beans was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and post-monsoon seasons was significantly higher than pre-monsoon season.

For Beans, it has been inferred that the total production is showing an increment of 20.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 80.00% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of Beans in different seasons.

H_{1d}: There is a variation in the average productivity of Bottle Gourd at different seasons.

Descriptive Statistics

Table 4.17 Average productivity of Bottle Gourd in tons in different seasons (Pre- Monsoon, Monsoon and Post-Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	0.64	0.2783
Monsoon	1.20	0.5715
Post-Monsoon	1.40	0.9101

ANOVA

Table 4.18 Average productivity of Bottle Gourd in tons in different seasons (Pre-Monsoon, Monsoon and Post-Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	7.760	2	3.880	9.444	0.000
Within seasons	29.580	137	0.411		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 0.64, S.D = 0.2783), Monsoon (M = 1.20, S.D = 0.5715) and in Post-Monsoon (M = 1.40, S.D = 0.9101).

The analysis of variance table depicts, the value of F = 9.444 and the sig. value is 0.000, for the average productivity of Bottle Gourd in tons in different seasons.

The analysis of variance states that the average productivity of Bottle Gourd was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and the post-monsoon seasons was significantly higher than pre-monsoon season.

For Bottle Gourd, it has been inferred that the total production is showing an increment of 16.66% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 46.66% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of Bottle Gourd in different seasons.

H_{1e}: There is a variation in the average productivity of Tomato at different seasons.

Descriptive Statistics

Table 4.19 Average productivity of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	0.88	0.4113
Monsoon	1.60	0.7984
Post-Monsoon	2.00	0.9464

ANOVA

Table 4.20 Average productivity of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	16.107	2	8.053	14.191	0.000
Within seasons	40.860	137	0.568		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 0.88, S.D = 0.4113), Monsoon (M = 1.60, S.D = 0.7948) and in Post-Monsoon (M = 2.00, S.D = 0.9464).

The analysis of variance table depicts, the value of F = 14.191 and the sig. value is 0.000, for the average productivity of Bottle Gourd in tons in different seasons.

The analysis of variance states that the average productivity of Tomato was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and post -monsoon seasons was significantly higher than pre-monsoon season.

For Tomato, it has been inferred that the total production is showing an increment of 25.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 45.00% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of Tomato in different seasons.

H_{1f}: There is a variation in the average productivity of Brinjal at different seasons.

Descriptive Statistics

Table 4.21Average productivity of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	1.0	0.4453
Monsoon	2.0	0.6075
Post-Monsoon	3.0	1.1438

ANOVA

Table 4.22 Average productivity of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	50.000	2	25.000	39.982	0.000
Within seasons	45.020	137	0.625		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 1.0, S.D = 0.4453), Monsoon (M = 2.0, S.D = 0.6075) and in Post-Monsoon (M = 3.0, S.D = 1.1438).

The analysis of variance table depicts, the value of F = 39.982 and the sig. value is 0.000, for the average productivity of Brinjal in tons in different seasons.

The analysis of variance states that the average productivity of Brinjal was found the highest during the post-monsoon season, which is at par with the monsoon season. The average productivity during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Brinjal, it has been inferred that the total production is showing an increment of 50.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 50% from monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average productivity of Brinjal in different seasons.

9.4 Anova was carried out to find the price variation in average production cost of vegetables in different seasons (Pre Monsoon, Monsoon and Post Monsoon).

Test for Hypothesis H_2: There is a variation in the average production cost of vegetables at different seasons.

H_{2a}: There is a variation in the average production cost of Cauliflower at different seasons.

Descriptive Statistics

Table 4.23 Average production cost of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	3605.00	1966.68
Monsoon	5269.78	2775.14
Post-Monsoon	6405.00	4041.48

ANOVA

Table 4.24 Average production cost of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	99168509.44	2	49584254.72	5.331	0.007
Within seasons	669670320.91	137	9300976.67		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 3605.00, S.D = 1966.68), Monsoon (M = 5269.78, S.D = 2775.14) and in Post-Monsoon (M = 6405.00, S.D = 4041.48).

The analysis of variance table depicts, the value of F = 5.331 and the sig. value is 0.007, for the average cost of production of Cauliflower in tons in different seasons.

The analysis of variance states that the average cost of production of Cauliflower was found the highest during the post-monsoon season, which is at par with the monsoon season. The average cost of production during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Cauliflower, it has been inferred that the total production cost is showing an increment of 31.59% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 21.54% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average production cost of Cauliflower in different seasons.

H_{2b}: There is a variation in the average production cost of Cabbage at different seasons.

Descriptive Statistics

Table 4.25 Average production cost of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	5950.00	4183.06
Monsoon	7468.56	3625.64
Post-Monsoon	7931.52	3431.46

ANOVA

Table 4.26 Average production cost of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	53723149.54	2	26861574.77	6.588	0.002
Within seasons	1018039951.38	137	14139443.76		

Interpretation

The above two table states about the descriptive statistics and analysis of variance. From the table it can be understood in Pre-Monsoon (M = 5950.00, S.D = 4183.06), Monsoon (M = 7468.56, S.D = 3625.64) and in Post-Monsoon (M = 7931.52, S.D = 3431.46).

The analysis of variance table depicts, the value of F = 6.588 and the sig. value is 0.002, for the average cost of production of Cabbage in tons in different seasons.

The analysis of variance states that

For Cabbage, it has been inferred that the total production cost is showing an increment of 20.33% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 6.20% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average production cost of Cabbage in different seasons.

H_{2c}: There is a variation in the average production cost of Beans at different seasons.

Descriptive Statistics

Table 4.27 Average production cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	345.00	153.48
Monsoon	1417.40	678.52
Post-Monsoon	1712.92	797.96

ANOVA

Table 4.28 Average production cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	25905046.43	2	12952523.21	34.672	.000
Within seasons	26897052.66	137	373570.17		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average production cost of Beans. From the table it can be understood in Pre-Monsoon (M = 345.00, S.D =), Monsoon (M = 1417.40, S.D = 678.52) and in Post-Monsoon (M = 1712.92, S.D = 797.96).

The analysis of variance table depicts, the value of F = 34.672 and the sig. value is 0.000, for the average production cost of Beans in tons in different seasons.

The average cost of production of Beans was found the highest during the post-monsoon season which is at par with the monsoon season. The average cost of production during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Beans, it has been inferred that the total production cost is showing an increment of 20.84% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 75.65% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average cost of production of Beans in different seasons.

H_{2d}: There is a variation in the average production cost of Bottle Gourd at different seasons.

Descriptive Statistics

Table 4.29 Average production cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	6320.00	2749.08
Monsoon	9552.61	4550.34
Post-Monsoon	10446.80	6971.37

ANOVA

Table 4.30 Average production cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	235665412.24	2	117832706.12	4.752	0.012
Within seasons	1785261694.65	137	24795301.31		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average production cost of Bottle Gourd. From the table it can be understood in Pre-Monsoon (M = 6320.00, S.D = 2749.08), Monsoon (M = 9552.61, S.D = 4550.34) and in Post-Monsoon (M = 10446.80, S.D = 6971.37).

The analysis of variance table depicts, the value of F = 4.752 and the sig. value is 0.012, for the average production cost of Bottle Gourd in tons in different seasons.

The average production cost of Bottle Gourd was found the highest during the post-monsoon season which is at par with the monsoon season. The average production cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Bottle Gourd, it has been inferred that the total production cost is showing an increment of 9.30% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 33.84% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average production cost of Bottle Gourd in different seasons.

H_{2e}: There is a variation in the average production cost of Tomato at different seasons.

Descriptive Statistics

Table 4.31 Average production cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	13244.00	6190.04
Monsoon	18419.20	9191.59
Post-Monsoon	25123.28	11890.21

ANOVA

Table 4.32 Average production cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	1773705641.70	2	886852820.85	10.071	0.000
Within seasons	6340304449.44	137	88059784.02		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average production cost of Tomato. From the table it can be understood in Pre-Monsoon (M = 13244.00, S.D = 6190.04), Monsoon (M = 18419.20, S.D = 9191.59) and in Post-Monsoon (M = 25123.28, S.D = 11890.21).

The analysis of variance table depicts, the value of F = 10.071 and the sig. value is 0.000, for the average production cost of Tomato in tons in different seasons.

The average production cost of tomato was found the highest during the post-monsoon season which is at par with the monsoon season. The average production cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Tomato, it has been inferred that the total production cost is showing an increment of 36.39% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 28.09% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the production cost of Tomato in different seasons.

H_{2f}: There is a variation in the average production cost of Brinjal at different seasons.

Descriptive Statistics

Table 4.33 Average production cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	9375.00	4175.12
Monsoon	15673.97	4761.69
Post-Monsoon	22986.00	8763.97

ANOVA

Table 4.34 Average production cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	2320017621.87	2	1160008810.93	29.766	0.000
Within seasons	2805905838.98	137	38970914.43		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average production cost of Brinjal. From the table it can be understood in Pre-Monsoon (M = 9375.00, S.D = 4175.12), Monsoon (M = 15673.97, S.D = 4761.69) and in Post-Monsoon (M = 22986.00, S.D = 8763.97).

The analysis of variance table depicts, the value of F = 29.766 and the sig. value is 0.000, for the average production cost of Brinjal in tons in different seasons.

The average production cost of Brinjal was found the highest during the post-monsoon season, which is at par with the monsoon season. The average production cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Brinjal, it has been inferred that the total production cost is showing an increment of 46.66% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 40.18% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average production cost of Brinjal in different seasons.

9.5 Anova was carried out to find the price variation in average transportation cost of vegetables in different seasons (Pre Monsoon, Monsoon and Post Monsoon).

Test for Hypothesis H_3: There is a variation in the average transportation cost of vegetables at different seasons.

H_{3a}: There is a variation in the average transportation cost of Cauliflower at different seasons.

Descriptive Statistics

Table 4.35 Average transportation cost of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	875.00	477.35
Monsoon	1625.00	855.81
Post-Monsoon	1875.00	1183.10

ANOVA

Table 4.36 Average transportation cost of Cauliflower in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	13541666.66	2	6770833.33	8.607	0.000
Within seasons	56640625.00	137	786675.34		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average transportation cost of Cauliflower. From the table it can be understood in Pre-Monsoon (M = 875.00, S.D = 477.35), Monsoon (M = 1625.00, S.D = 855.81) and in Post-Monsoon (M = 1875.00, S.D = 1183.10).

The analysis of variance table depicts, the value of F = 8.607 and the sig. value is 0.000, for the average transportation cost of Cauliflower in tons in different seasons.

The average transportation cost of Cauliflower was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Cauliflower, it has been inferred that the total transportation cost is showing an increment of 46.15% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 15.38% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Cauliflower in different seasons.

H_{3b}: There is a variation in the average transportation cost of Cabbage at different seasons.

Descriptive Statistics

Table 4.37 Average transportation cost of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	1750.00	1230.31
Monsoon	2750.00	1335.00
Post-Monsoon	3000.00	1297.90

ANOVA

Table 4.38 Average transportation cost of Cabbage in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	21875000.00	2	10937500.00	6.588	0.002
Within seasons	119531250.00	137	1660156.250		

Interpretation

The above two table states about the descriptive statistics and analysis of variance average transportation cost of Cabbage. From the table it can be understood in Pre-Monsoon (M = 1750.00, S.D = 1230.31), Monsoon (M = 2750.00, S.D = 1335.00) and in Post-Monsoon (M = 3000.00, S.D = 1297.90).

The analysis of variance table depicts, the value of F = 6.588 and the sig. value is 0.002, for the average transportation cost of Cabbage in tons in different seasons.

The average transportation cost of Cabbage was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Cabbage, it has been inferred that the total transportation cost is showing an increment of 9.09% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 36.36% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Cabbage in different seasons.

H_{3c}: There is a variation in the average transportation cost of Beans at different seasons.

Descriptive Statistics

Table 4.39 Average transportation cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	125.00	55.60
Monsoon	625.00	299.19
Post-Monsoon	750.00	349.38

ANOVA

Table 4.40 Average transportation cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	5468750.00	2	2734375.00	38.211	0.000
Within season	5152343.75	137	71560.33		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average transportation cost of Beans. From the table it can be understood in Pre-Monsoon (M = 125.00, S.D = 55.60), Monsoon (M = 625.00, S.D = 299.19) and in Post-Monsoon (M = 750.00, S.D = 349.38).

The analysis of variance table depicts, the value of F = 38.211 and the sig. value is 0.000, for the average transportation cost of Beans in tons in different seasons.

The average transportation cost of Beans was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Beans, it has been inferred that the total transportation cost is showing an increment of 20.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 80.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Beans in different seasons.

H_{3d}: There is a variation in the average transportation cost of Bottle Gourd at different seasons.

Descriptive Statistics

Table 4.41 Average transportation cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	2000.00	869.96
Monsoon	3750.00	1786.08
Post-Monsoon	4375.00	2844.15

ANOVA

Table 4.42 Average transportation cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	75781250.00	2	37890625.00	9.444	0.000
Within seasons	288867187.50	137	4012044.27		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average transportation cost of Bottle Gourd. From the table it can be understood in Pre-Monsoon (M = 2000.00, S.D = 869.96), Monsoon (M = 3750.00, S.D = 1786.08) and in Post-Monsoon (M = 4375.00, S.D = 2844.15).

The analysis of variance table depicts, the value of F = 9.444 and the sig. value is 0.000, for the average transportation cost of Bottle Gourd in tons in different seasons.

The average transportation cost of Bottle Gourd was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Bottle Gourd, it has been inferred that the total transportation cost is showing an increment of 16.66% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 87.50% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Bottle Gourd in different seasons.

H_{3e}: There is a variation in the average transportation cost of Tomato at different seasons.

Descriptive Statistics

Table 4.43 Average transportation cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	2750.00	1285.30
Monsoon	5000.00	2495.11
Post-Monsoon	6250.00	2957.76

ANOVA

Table 4.44 Average transportation cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	157291666.66	2	78645833.33	14.191	0.000
Within seasons	399023437.50	137	5541992.18		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average transportation cost of Tomato. From the table it can be understood in Pre-Monsoon (M = 2750.00, S.D = 1285.30), Monsoon (M = 5000.00, S.D = 2495.11) and in Post-Monsoon (M = 6250.00, S.D = 2957.76).

The analysis of variance table depicts, the value of F = 14.191 and the sig. value is 0.000, for the average transportation cost of Tomato in tons in different seasons.

The average transportation cost of tomato was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Tomato, it has been inferred that the total transportation is showing an increment of 25.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 45.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Tomato in different seasons.

H_{3f}: There is a variation in the average transportation cost of Brinjal at different seasons.

Descriptive Statistics

Table 4.45 Average transportation cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	3125.00	1391.70
Monsoon	6250.00	1898.72
Post-Monsoon	9375.00	3574.44

ANOVA

Table 4.46 Average transportation cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	488281250.00	2	244140625.00	39.982	0.000
Within seasons	439648437.50	137	6106228		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average transportation cost of Brinjal. From the table it can be understood in Pre-Monsoon (M = 3125.00, S.D = 1391.70), Monsoon (M = 6250.00, S.D = 1898.72) and in Post-Monsoon (M = 9375.00, S.D = 3574.44).

The analysis of variance table depicts, the value of F = 39.982 and the sig. value is 0.000, for the average transportation cost of Brinjal in tons in different seasons.

The average transportation cost of Brinjal was found the highest during the post-monsoon season which is at par with the monsoon season. The average transportation cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Brinjal, it has been inferred that the total transportation cost is showing an increment of 50.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 50.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average transportation cost of Brinjal in different seasons.

9.6 Anova was carried out to find the price variation in average packaging cost of vegetables in different seasons (Pre Monsoon, Monsoon and Post Monsoon).

Test for Hypothesis H_4: There is a variation in the average packaging cost of vegetables at different seasons.

H_{4a}: There is a variation in the average packaging cost of Beans at different seasons.

Descriptive Statistics

Table 4.47 Average packaging cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	10.80	4.80
Monsoon	54.00	25.85
Post-Monsoon	64.80	30.18

ANOVA

Table 4.48 Average packaging cost of Beans in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	40824.00	2	20412.00	38.211	0.000
Within seasons	38462.04	137	534.195		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average packaging cost of Beans. From the table it can be understood in Pre-Monsoon (M = 10.80, S.D = 4.80), Monsoon (M = 54.00, S.D = 25.85) and in Post-Monsoon (M = 64.80, S.D = 30.18).

The analysis of variance table depicts, the value of F = 38.211 and the sig. value is 0.000, for the average packaging cost of Beans in tons in different seasons.

The average packaging cost of Beans was found the highest during the post-monsoon season which is at par with the monsoon season. The average packaging cost during

the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Beans, it has been inferred that the total packaging cost is showing an increment of 20.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 80.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average packaging cost of Beans in different seasons.

H_{4b}: There is a variation in the average packaging cost of Bottle Gourd at different seasons.

Descriptive Statistics

Table 4.49 Average packaging cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	640.00	278.38
Monsoon	1200.00	571.54
Post-Monsoon	1400.00	910.12

ANOVA

Table 4.50 Average packaging cost of Bottle Gourd in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	7760000.00	2	3880000.00	9.444	0.000
Within seasons	29580000.00	137	410833.33		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average packaging cost of Bottle Gourd. From the table it can be understood in Pre-Monsoon (M = 640.00, S.D = 278.38), Monsoon (M = 1200.00, S.D = 571.54) and in Post-Monsoon (M = 1400.00, S.D = 910.12).

The analysis of variance table depicts, the value of F = 9.444 and the sig. value is 0.000, for the average of average packaging cost of Bottle Gourd in tons in different seasons.

The average packaging cost of Bottle Gourd was found the highest during the post-monsoon season which is at par with the monsoon season. The average packaging cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Bottle Gourd, it has been inferred that the total packaging cost is showing an increment of 16.66% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 46.66% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average packaging cost of Bottle Gourd in different seasons.

H_{4C}: There is a variation in the average packaging cost of Tomato at different seasons.

Descriptive Statistics

Table 4.51 Average packaging cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	2200.00	1028.24
Monsoon	4000.00	1996.08
Post-Monsoon	5000.00	2366.21

ANOVA

Table 4.52 Average packaging cost of Tomato in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	100666666.66	2	50333333.33	14.191	0.000
Within seasons	255375000.00	137	3546875.00		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average packaging cost of Tomato. From the table it can be understood in Pre-Monsoon (M = 2200.00, S.D = 1028.24), Monsoon (M = 4000.00, S.D = 1996.08) and in Post-Monsoon (M = 5000.00, S.D = 2366.21).

The analysis of variance table depicts, the value of F = 14.191 and the sig. value is 0.000, for the average of average packaging cost of Tomato in tons in different seasons.

The average packaging cost of tomato was found the highest during the post-monsoon season which is at par with the monsoon season. The average packaging cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Tomato, it has been inferred that the total packaging cost is showing an increment of 25.00% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 45.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average packaging cost of Tomato in different seasons.

H_{4d}: There is a variation in the average packaging cost of Brinjal at different seasons.

Descriptive Statistics

Table 4.53 Average packaging cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

Seasons	Mean (in Tons)	Std. Deviation
Pre-Monsoon	150.00	66.80
Monsoon	300.00	91.13
Post-Monsoon	451.80	176.97

ANOVA

Table 4.54 Average packaging cost of Brinjal in tons in different seasons (Pre Monsoon, Monsoon and Post Monsoon)

	Sum of Squares	df	Mean Square	F	Sig.
Between seasons	1138554.00	2	569277.00	38.738	0.000
Within seasons	1058094.00	137	14695.75		

Interpretation

The above two table states about the descriptive statistics and analysis of variance of average packaging cost of Brinjal. From the table it can be understood in Pre-Monsoon (M = 150.00, S.D = 66.80), Monsoon (M = 300.00, S.D = 91.13) and in Post-Monsoon (M = 451.80, S.D = 176.97).

The analysis of variance table depicts, the value of F = 38.738 and the sig. value is 0.000, for the average of average packaging cost of Brinjal in tons in different seasons.

The average packaging cost of Brinjal was found the highest during the post-monsoon season which is at par with the monsoon season. The average packaging cost during the monsoon and post-monsoon seasons was significantly higher than the pre-monsoon season.

For Brinjal, it has been inferred that the total packaging cost is showing an increment of 50.60% from monsoon to post-monsoon and on the other hand the same is showing a reduction of 50.00% form monsoon to pre-monsoon.

Hence, the alternative hypothesis has been accepted, which states that, there is a variation in the average packaging cost of Brinjal in different seasons.

10. Contribution

In this study, six vegetables are considered regarding the price variation in different seasons. The study also seeks to find out the price variation of the vegetables from farmers to consumer through different intermediaries like the middle men, wholesaler, and organized retailers, especially the organized retailers. In this context, it is important to examine the actual cost of production, total land for cultivation, the various agricultural inputs and the selling price of the vegetables from the farmers' end.

On the other side numbers of intermediaries that exist in the process of supply chain and marketing of vegetables through which the retails get in touch for procuring of these vegetables.

Also, it was said the farmers get less price for their vegetables as compared to the Haats and Mandi. The various areas were considered so that the actual value of the product can be identified and the price variation of the concerned vegetables can be identified in different seasons.

11. Limitations of the Research

Limitations of this research are as follows:

- The study is limited to respondents related to only selected vegetables and the farmers who owe around four acres of land. The other types of vegetables and farmers are not being studied in this research project.
- The study is limited to only Ranchi and its adjoining area like Brambe, Murma, and Thakurgoan only. The other parts of Ranchi are not being studied.

- Only organized retail is considered instead of unorganized retail and major haats or bazaar.
- The study limited to data collection over a period from December 2016 to January 2018
- The responses from the respondents can be biased and as a result, some findings can be incorrect.

12. Future Scope of study

Considering the country India, still a more agrarian society, it has lot of future scope to contribute to the development and growth of our country from Rural to Urban society. The following future study can be done:

- The research was mainly confined to Ranchi district, so this study can be explored in other locations or different states of the country.
- During the research it was found that the large quantity of vegetables is sold through unorganized retails. Therefore a separate study can be done on the price variation of vegetables with respect to unorganized retails.
- The survey can be conducted by increasing sample size of all categories in other regions of the state and country where most of the farmers and retailers can be entertained.
- The research framework, which has been used in the research, can be used for research in other countries or states with similar socio-economic conditions.

13. Conclusion

Marketing of vegetables is a complex phenomenon due to their perishable nature, seasonality and bulkiness. It is further compounded by the fact, that farmers have small areas under their cultivation and small marketable quantity. The production and post-harvest losses are higher and as such vegetables require a developed marketing system for their quick disposal. It has also been observed that as the number of intermediaries' increases, the producer's share in consumer price decreases. The net price received by the producers is higher in the channel where they sell the produce directly to the consumers

or retailers. The producers have been found to receive higher absolute net returns in tomato, followed by Cauliflower, cabbage, brinjal, and local bean in all the channels.

There is a major price variation in price of some selected vegetables. There is a maximum variation regarding tomato, brinjal, beans and bottle gourd. The farmers do not get appropriate value for their produce vegetables. Due to lack of storage they can't be able to hold back these vegetables with them for a long period of time after the cultivation because of its perishability in nature, so they have to sell within a particular period of time at the intermediary's price. The result the farmer does not get proper value and intermediaries like mahajans earn more than the farmers. These intermediaries also play a vital role in fixing the price of the vegetables and sell in the market or to the retailers as their convenient.

There is a variation in price and quantity of different vegetables i.e. cauliflower, cabbage, beans, bottle gourd, brinjal and tomato at different seasons regarding the average productivity, average production cost, average transportation cost and average packaging cost. The average productivity, average production cost, average transportation cost and average packaging cost were found the highest for all the vegetables during the post monsoon season which is at par with monsoon season. The average productivity during the monsoon and post monsoon seasons was significantly higher than pre monsoon season.

Thus for the benefit of farmers they should maintain the demand and supply system and along this they have to get some storage facilities through which they can sell their produce at better margin when they are in great demand.

14. Major Findings

Based on the analysis various major findings are made which are listed below.

1. There is variation in production, production cost, transportation cost and packaging cost among the seasons.
2. The average productivity, average production cost, average transportation cost and average packaging cost were found the highest for all the vegetables during the post monsoon season which is at par with the monsoon season

3. The average productivity during the monsoon and post monsoon seasons was significantly higher than pre-monsoon season.
4. Production of cauliflower, cabbage and tomato is the highest where as the productivity of brinjal, beans and bottle gourd is found majority of the total area that is taken into consideration.
5. There is a percentage of variation regarding the total cost of production, selling price of the farmers and selling price of the organized retailers in two different seasons of a concerned vegetables.
6. It has been inferred that the total production is showing an increment of 46.16% for Cauliflower, 36.36% for Cabbage, 20.00% for Beans, 16.66% for Bottle Gourd, 25.00% for Tomato and 50.00% for Brinjal from monsoon to post-monsoon and on the other hand the same is showing a reduction of 15.38% for Cauliflower, 9.09% for Cabbage, 80.00% for Beans, 46.66% for Bottle Gourd, 45.00% for Tomato and 50.00% for Brinjal from monsoon to pre-monsoon.
7. It has been inferred that the total production cost is showing an increment of 31.59% for Cauliflower, 20.33% for Cabbage, 20.84% for Beans, 09.30% for Bottle Gourd, 36.39% for Tomato and 46.66% for Brinjal from monsoon to post-monsoon and on the other hand the same is showing a reduction of 21.54% for Cauliflower, 06.20% for Cabbage, 75.65% for Beans, 33.84% for Bottle Gourd, 28.09% for Tomato and 40.18% for Brinjal from monsoon to pre-monsoon.
8. It has been inferred that the total transportation cost is showing an increment of 46.15% for Cauliflower, 09.09% for Cabbage, 20.00% for Beans, 16.66% for Bottle Gourd, 25.00% for Tomato and 50.00% for Brinjal from monsoon to post-monsoon and on the other hand the same is showing a reduction of 15.38% for Cauliflower, 36.36% for Cabbage, 80.00% for Beans, 87.5% for Bottle Gourd, 45.00% for Tomato and 50.00% for Brinjal from monsoon to pre-monsoon.
9. It has been inferred that the total packaging cost is showing an increment of 20.00% for Beans, 16.66% for Bottle Gourd, 25.00% for Tomato and 50.60% for Brinjal from monsoon to post-monsoon and on the other hand the same is showing a

reduction of 80.00% for Beans, 46.66% for Bottle Gourd, 45.00% for Tomato and 50.00% for Brinjal from monsoon to pre-monsoon.