

# Exploring Challenges & Strategies of Agriculture Product Exporters: Fresh Fruits and Vegetables in Coimbatore District

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**ABSTRACT-** The agriculture sector's revenues are mostly derived from the export of fresh fruits and vegetables. However, a number of obstacles prevent exporters from competing in the global market. The aim of the study is to identify workable solutions and look at the challenges faced by the exporters. The study also found a number of tactics that exporters can use to get beyond these obstacles, including diversifying export markets, investing in logistical infrastructure, and implementing quality management systems. The study also emphasizes how crucial trade agreements and government assistance are to promoting the export of fresh produce. The research emphasizes the significance of trade agreements and government assistance in increasing fresh product exports. This study is to support the expansion and competitiveness of the fresh fruit and vegetable export sector by examining the difficulties faced by exporters and determining practical solutions.

**Keywords:** Agriculture Products, Logistics infrastructure, Market Diversification Quality Management system, Supply Chain, Sustainability.

## I. INTRODUCTION

The export of fresh fruits and vegetables, a sector with enormous growth potential, is a major component of India's agricultural economy. Coimbatore, a well-known city in Tamil Nadu, stands out among the other centres for agricultural exports because of its ideal climate and advantageous location. Fresh produce exports from the city are vital, particularly to Southeast Asia, Europe, and the Middle East. However, a number of obstacles prevent Coimbatore exporters from efficiently competing in the global market. India's agricultural export sector has grown significantly and it resulted and there is a increasing need for fresh products around the world. A substantial amount of these exports are products, which are fuelled by Coimbatore's distinct climate and close proximity to important markets.

Exporters have several challenges despite making a significant economic contribution to the area, especially when handling perishable goods. These difficulties include restricted access to global markets, logistical limitations, and supply chain inefficiencies. The study examine the unique challenges that Coimbatore's exporters of fresh fruits and vegetables encounter. While providing workable ways

to boost performance, it aims to pinpoint the crucial elements impacting the sustainability and effectiveness of export operations.

The study focuses on resolving major issues in the export supply chain and coming up with plans to make this crucial sector more competitive. The goal of the study is to fully realize the export potential of Coimbatore's agricultural products by comprehending and addressing the difficulties experienced by exporters. It offers doable suggestions to increase output, promote sustainability, and raise the area's profile in the global fresh produce market.

This study is to emphasis on Coimbatore's fresh fruit and vegetable industry, the study will contribute to the corpus of knowledge presently accessible on agricultural exports from India. Policymakers, exporters, and other stakeholders will be able to create focused plans to solve exporters' issues and improve the competitiveness of India's agricultural export industry thanks to the findings, which will offer insightful information.

This study analyse the difficulties faced by exporters and the methods they use to overcome them, with a particular focus on the Coimbatore fresh fruit and vegetable export industry. Primary and secondary data gathered via surveys,

interviews, and literature analysis will form the foundation of the study. This study intends to give a thorough grasp of the dynamics of the industry and pinpoint chances for expansion and development by investigating the problems and difficulties encountered by Coimbatore's fresh fruit and vegetable exporters.

## II. REVIEW OF LITERATURE

- Mohammed Hassan Mohamed<sup>1</sup>, Justus M. Ombati, and Abdullahi Farah Ahmed (2024). Farmers face challenges such as low-quality seeds, limited fertilizer supplies, and a lack of effective pest management strategies. The goal of this paper was to investigate how selected variables (access to agricultural inputs, loans, and market information) influenced sesame production among smallholder farmers in Bal'ad, Middle Shabelle, Somalia. The target population consisted of 3098 sesame growers. Purposive and simple random sampling were used to choose a sample of respondents. The sample size consisted of 148 farmers. Extension services should guarantee that new farmers have access to sesame production inputs.
- Adeniyi Suraju Amusat (2024) conducted a study on the adoption of IAR&T small ruminant technology among farmers in South-Western Nigeria. Using a multistage sampling technique, 160 individuals were selected for the research. Data were gathered through an interview schedule and analyzed using both descriptive (percentages and mean scores) and inferential statistics (Chi-square and PPMC). The findings revealed that the most widely adopted technologies were also the most accessible. Based on this, it is recommended that IAR&T focus on improving the availability of its technologies to end users.
- Sandeep Janghu, Vikas Kumar and Ashok Kumar Yadav (2024) Numerous To tackle these challenges, various post-harvest technologies and treatments have been developed. These include methods to slow down senescence and decay, controlled atmosphere storage for regulating oxygen and carbon dioxide levels, and pre-cooling treatments to reduce temperatures and pause physiological processes. Washing, sorting, grading, and waxing are post-harvest processes that assist to decrease microbial contamination and increase shelf life. Sustainable packaging also offers ecologically responsible methods for keeping food fresh while reducing environmental impact. Real-time monitoring of the supply chain for environmental conditions and product quality allows for prompt action to reduce losses and improve storage conditions.
- Manjit Singh, Shwet Kamal, and VP Sharma (2021) Commercial mushroom farming in the world began only after WWII (Singh et al., 2017). During the 1960s, the button mushroom was the most widely accessible farmed In reality, statistics from the United States for the year 2020 showed that both output and productivity were affected, notably in the California region (Singh et al., 2020). This had an influence on both production, processing, and consumption. These data should be used as a standard to understand production changes.
- Shivangi Sharma and Gita Bisla (2021) Cherries, particularly sweet cherries, are a nutritionally packed fruit with a pleasant flavor, an appealing appearance, a tiny size, and limestone fruit. First, the proximate composition, certain vitamins and minerals, non-nutrient chemicals, and antioxidant compounds were evaluated in dried red sweet cherry powder. In the current investigation, a product was created by using cherry powder. The cookies were produced in four forms (variant A, variant B, variant C, and variant D) and tested for sensory acceptability. The most acceptable cookie variant discovered was variant C. The product cookies were found to be high in moisture, fat, beer, protein, iron, calcium, total soluble solids, water activity, pH, breaking strength, and viscosity.
- Abdul Kadhar (2019) performed research on the obstacles and possibilities for agri-export businesses and discovered that agricultural production increased dramatically with the opening of new western territories. The (APEDA) was established in 1986 by an Act of Parliament to promote Indian agricultural commodities and processed foods exports.
- Joseph Mayindo Mayele, John Bosco Lamoris Okullo, Susan Balaba Tumwebaze, and Augustine Lokule Bongo (2019). Key informant interviews and Focused Group Discussions were utilized. Data analyses were conducted using descriptive statistics, which included comparing frequencies and percentages, while others were presented in charts and visual representations. The findings revealed that the majority of families used agrisilvopastoral agroforestry systems, with dispersed trees on farms, border plantings, home gardens, and woodlots as on-farm arrangements. While goats and hens were the most commonly reported domestic animals, the primary recorded food crops were sorghum, beans, groundnuts, cassava, maize, and semis. Farmers should be encouraged to undertake agroforestry, which leads

to increased food availability and accessibility, in order to become food-secure families.

- Vimal Chandra Pandey, P.C. Abhilash, and Nandita Singh (2019) Many foreign researchers have focused on reclamation, revegetation, and FA usage. FA use conserves resources, particularly land (topsoil), water, coal, limestone, and chemical fertilizer. The safe use of FA is a serious problem across the world, and regulatory organizations are imposing strict guidelines for its correct administration. This article highlights different possible options in India for FA usage and environmental management.
- Sri Durga Prasad (2018), who conducted research on the analysis of soya bean exporters in the agricultural business, India is the world's third largest producer of coconut and ranks first among 90 cocoanut-producing countries. Extreme swings and changes in weather conditions disrupt food production and harm the livelihoods of millions of farmers across the country.
- Gouri Sankar Bhunia (2019). A conceptual framework was created for big data applications in smart farming for horticultural improvement, as well as a future development plan. This study would be useful in encouraging researchers to enhance horticulture development through post-harvest crop management in India and other poor nations. The paper discusses numerous applications of geospatial technology, such as satellite data, image processing operations for orchard demarcation, and suggested plans for smart horticulture growth in India.
- Dr. G. Vengesh and Dr. P. Gurusamy (2018) Everyone in the nation is becoming more health conscious and eager to consume the highest quality protein. As a result, the 21st century is seeing a gradual increase in the consumption habits of both farmed mushrooms and natural veggies. Due to the fact that both mushroom growers and exporters in India encounter minimal difficulties. Whole mushroom exporters are using eight long-term strategies to overcome their challenges. These strategies include product categorization, mushroom cultivation quality, spreading the mushroom throughout potential areas, improving mushroom quality and packaging, gradually expanding market reachability, and providing value-added services.
- Vijay Singh, Ajay N. Patel, Apurva Dalwadi, Jaydipsinh Kathota, Jignesh Suthar, and Manik H. Kalubarme (2017) explored the development and production of horticulture products, often referred to as the "Golden Revolution." India, as the world's second-largest producer of fruits and vegetables, has seen significant growth in this sector. To support this, the Central Government of India launched the National Horticulture Mission (NHM), while the Gujarat Government initiated the Gujarat State Horticulture Mission (GSHM). The study employed an innovative approach to mapping fruit crop plantations using high-resolution, single-band CARTOSAT-1 panchromatic data overlaid on cadastral maps with survey numbers. This method yielded highly satisfactory results for the development of a village-level horticulture atlas in Gujarat. Additionally, a field survey was conducted across multiple locations to validate the accuracy of survey numbers associated with horticulture plantations.
- Singh, H. P. (2016) Soil test facilities and micro labs would be available at ICAR agricultural universities and institutes across the country. The decision has been made to provide an 80% subsidy for the establishment of 2000 micro laboratories for farmer clusters. To boost the organic value chain in North Eastern States, a sum of Rs. 400 crore was given in 2015-2016 for the next three years for the development of North Eastern States and organic value chains. This plan was launched with an allocation of Rs. 125 crore in 2015-2016, paving the path for the Organic Agriculture plan's expansion. The remaining 275 crore rupees would be used to fund initiatives planned for the next year (2016-2017 and 2017-2018).
- Dr. Poorna K and Karthika R (2016), in their study "A Study on Challenges Faced by Perishable Exporters with Special Reference to Coimbatore," examine the difficulties associated with exporting perishable goods. Due to their natural tendency to degrade over time, these products—particularly food items—are highly susceptible to spoilage, decay, and loss of quality without proper refrigeration and preservation techniques. Perishable food products such as fresh fruits, vegetables, meat, dairy, and eggs require strict temperature and storage controls during transportation to maintain their quality. This study aims to provide deeper insights into these challenges, serving as a valuable reference for future research and facilitating progress assessments at both national and global levels.
- Saurav Negi and Neeraj Anand (2015), in their study "Issues and Challenges in the Supply Chain of Fruits & Vegetables Sector in India," examine the various challenges and barriers affecting the efficiency of India's fruit and vegetable supply chain. A comprehensive analysis of this sector is crucial to identifying key issues and formulating

effective solutions. The study focuses on understanding the supply chain dynamics of the fruit and vegetable industry in India while highlighting the critical challenges that impact its efficiency and long-term sustainability.

## RESEARCH GAP

The optimization of cold chain logistics for perishable items, such as fresh fruits and vegetables, is not well studied, especially in poor nations. Non-tariff barriers such as strict quality standards and pesticide residue limitations imposed by importing nations require further research. Standardized frameworks for guaranteeing quality control across different export markets are lacking, particularly in emerging economies. There is little data on the effects of climate change on fresh fruit and vegetable export prospects, specifically with regard to crop yields, seasonal availability, and product quality. Research on cost-effective post-harvest handling methods for small and medium-sized producers is lacking.

## OBJECTIVES

- To identify the key challenges faced by the agricultural exporters of fresh fruits and vegetables.
- To identify the effective methods for managing inventory and reducing stockouts/overstocking in warehouse.
- To analyse the effects of environmental factors on the export of fresh fruits and vegetables.

## III. RESEARCH METHODOLOGY

Research methodology refers to the specific procedures and techniques employed to identify, select, process, and analyze information on a given topic. It provides a structured framework incorporating essential aspects that guide the research process throughout the study.

- **Research design:** Descriptive Research
- **Area of the study:** Coimbatore District
- **Sampling technique:** Probability Sampling (Simple Random Sampling)
- **Data collection:** Primary Data
- **Sample size:** 125
- **Tools used for analyses:** Simple Percentage Analysis, ANOVA, Chi-square, Ranking (Friedman ranking). Correlation

## IV. DATA ANALYSIS AND INTERPRETATION

**TABLE 01: SHOWING THE SIMPLE PERCENTAGE OF YEAR OF EXPERIENCE**

|  |                    | Frequency | Percent |
|--|--------------------|-----------|---------|
|  | less than 1 year   | 2         | 4.0     |
|  | 1-5 years          | 4         | 8.0     |
|  | 5-10 years         | 22        | 44.0    |
|  | more than 10 years | 22        | 44.0    |
|  | Total              | 50        | 100.0   |

### INTERPRETATION

In the above table 88% of those involved have more than five years of experience. The distribution of highly experienced (more than 10 years) and mid-level (5–10 years) people is balanced. Few people (12%) have fewer than five years of experience, which suggests that either few new hires are hired or that experienced workers are retained at high rates.

**TABLE 02: SHOWING THE SIMPLE PERCENTAGE OF ANNUAL TURNOVER**

|  |                            | Frequency | Percent |
|--|----------------------------|-----------|---------|
|  | Less than 100 metric tons  | 2         | 4.0     |
|  | 100-500 metric tons        | 3         | 6.0     |
|  | 500-1000 metric tons       | 19        | 38.0    |
|  | More than 1000 metric tons | 26        | 52.0    |
|  | Total                      | 50        | 100.0   |

### INTREPRETATION

In the above table trend toward larger-scale production is evident from the fact that 90% of the entities generate more than 500 metric tons. There is a concentration of high-capacity producers, since more than half (52%) of the companies are in the highest output category (more than 1000 metric tons). The fact that just 10% of manufacturers are small-scale (less than 100 metric tons and 100-500 metric tons) indicates that large-scale production is the norm.

**TABLE 03: SHOWING THE ANOVA ANALYSIS OF THE EXPERIENCED FLUCTUATIONS**

$H_0$ – There is no significant difference between the experienced fluctuations and year of experience

$H_1$ - There is significant difference between the experienced fluctuations and Year of experience

|                             |                | Sum of Squares | df  | Mean Square | F       | Sig. |   |
|-----------------------------|----------------|----------------|-----|-------------|---------|------|---|
| Experienced fluctuations    | Between Groups | 26.672         | 3   | 8.891       | 237.563 | .000 | S |
|                             | Within Groups  | 4.528          | 121 | .037        |         |      |   |
|                             | Total          | 31.200         | 124 |             |         |      |   |
| Yes there is a fluctuations | Between Groups | 54.317         | 2   | 27.158      | 72.281  | .000 | S |
|                             | Within Groups  | 21.417         | 57  | .376        |         |      |   |
|                             | Total          | 75.733         | 59  |             |         |      |   |



## INTERPRETATION

In the above table over 10 years of experience show the biggest disparity in fluctuations compared to all other groups. There are no statistically significant differences between those with less than ten years of experience. According to the pattern, professionals with ten or more years of expertise undergo variations that differ significantly from those with less experience.

Therefore, we reject  $H_0$  and accept  $H_1$ . This shows that there is a significant relationship between the experienced fluctuations and year of experience.

**TABLE 04: SHOWING THE CHI-SQUARE ANALYSIS OF ANNUAL TURNOVER WITH OVERCOME CHALLENGES**

$H_0$  – There is no significant relationship between the annual turnover with overcome challenges

$H_1$ - There is significant relationship between the annual turnover with overcome challenges

|                                                                                         | Value                | df | Asymptotic Significance (2-sided) |
|-----------------------------------------------------------------------------------------|----------------------|----|-----------------------------------|
| Pearson Chi-Square                                                                      | 188.497 <sup>a</sup> | 12 | .000                              |
| Likelihood Ratio                                                                        | 170.557              | 12 | .000                              |
| Linear-by-Linear Association                                                            | 91.949               | 1  | .000                              |
| N of Valid Cases                                                                        | 125                  |    |                                   |
| a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .32. |                      |    |                                   |

## INTERPRETATION

In the above table financial assistance is the primary source of support for smaller enterprises (less than 500 metric tons). Mid-sized companies (500–1000 metric tons) prioritize infrastructure upgrades and training. Government regulations and technological solutions are most advantageous to larger companies (those with more than 1000 metric tons). The most crucial elements for overcoming obstacles at high production levels are technological advancements and governmental regulations.

Therefore, we reject  $H_0$  and accept  $H_1$ . This shows that There is significant relationship between the annual turnover with overcome challenges

**TABLE 05: SHOWING THE CHI-SQUARE ANALYSIS OF ANNUAL TURNOVER WITH STROAGE INFRASTRUCTURE**

$H_0$  – There is no significant relationship between the annual turnover with storage infrastructure

$H_1$ - There is significant relationship between the annual turnover with storage infrastructure

|                                                                                         | Value                | df | Asymptotic Significance (2-sided) |
|-----------------------------------------------------------------------------------------|----------------------|----|-----------------------------------|
| Pearson Chi-Square                                                                      | 109.124 <sup>a</sup> | 8  | .000                              |
| Likelihood Ratio                                                                        | 143.715              | 8  | .000                              |
| Linear-by-Linear Association                                                            | 74.783               | 1  | .000                              |
| N of Valid Cases                                                                        | 125                  |    |                                   |
| a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is 1.25. |                      |    |                                   |

## INTERPRETATION

In the above table large-scale producers don't need cold storage at all, but smaller and mid-sized manufacturers depend on it. A shift from perishable to bulk storage is seen in the usage of a combination of ambient and cold storage warehouses by mid-sized enterprises (500–1000 metric tons). Due to economies of scale and effective distribution networks, large producers (more than 1000 metric tons) favour ambient warehouses and on-site farm storage.

Therefore, we reject  $H_0$  and accept  $H_1$ . This shows that there is significant relationship between the annual turnover with storage infrastructure

**TABLE 06: SHOWING THE CHI-SQUARE ANALYSIS OF YEAR OF EXPERIENCE WITH OVERCOME CHALLENGES**

$H_0$  – There is no significant relationship between the year of experience with overcome challenges

$H_1$ - There is significant relationship between the year of experience with overcome challenges

|                                                                                        | Value                | df | Asymptotic Significance (2-sided) |
|----------------------------------------------------------------------------------------|----------------------|----|-----------------------------------|
| Pearson Chi-Square                                                                     | 183.546 <sup>a</sup> | 8  | .000                              |
| Likelihood Ratio                                                                       | 169.256              | 8  | .000                              |
| Linear-by-Linear Association                                                           | 102.742              | 1  | .000                              |
| N of Valid Cases                                                                       | 125                  |    |                                   |
| a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .48. |                      |    |                                   |

## INTERPRETATION

In the above table Others with less experience are more interested in financial aid than in infrastructure or training. Training initiatives and infrastructure upgrades are given top priority by mid-level professionals, who pay little attention to funding or regulations. Highly skilled people don't want direct financial or training assistance; instead, they rely on government programs and technology access.

**TABLE 07: SHOWING THE RANK ANALYSIS OF ISSUES AND CHALLENGES OF AGRICULTURE EXPORTERS (FRIEDMAN RANKING TEST)**

|                               | Mean Rank |
|-------------------------------|-----------|
| Cold storage facilities       | 2.24      |
| transportation infrastructure | 6.36      |
| Sea /air transportation       | 5.96      |
| Warehouse storage             | 3.28      |
| Labelling and packaging       | 8.20      |
| Market strategies             | 5.56      |
| Documentation & paperwork     | 7.72      |
| certification                 | 8.20      |
| Tariff barriers               | 5.68      |

#### INTERPRETATION

In the above table the most important concern is infrastructure (1.80), which is followed by warehouse storage (3.28), and cold storage facilities (2.24). Not as urgent are market tactics (5.56), transportation (6.36), and tariff obstacles (5.68). The least important issues include certification (8.20), labeling & packaging (8.20), and documentation (7.72).

**TABLE 08: SHOWING THE RANK ANALYSIS OF ADOPTING NEW TECHNOLOGIES (FRIEDMAN RANKING TEST)**

|                                      | Mean Rank |
|--------------------------------------|-----------|
| Cost                                 | 2.94      |
| Lack of technical expertise          | 2.80      |
| Limited awareness about technologies | 2.50      |
| Lack of government support           | 3.90      |
| Inadequate infrastructure            | 2.86      |

#### INTERPRETATION

In the above table the most important problem is low technological awareness (2.50), which is followed by a lack of technical know-how (2.80) and poor infrastructure (2.86). Although cost (2.94) is a major problem, it is not the main one. Of the reasons mentioned, the least significant obstacle is a lack of government backing (3.90).

**TABLE 09: SHOWING THE CORRELATION ANALYSIS OF EXPORT CHALLENGES (KENDELLS TAU-B CORRELATION)**

|                         | Trade Restrictions | Exchange rate Fluctuations | High Logistics Cost | Lack of market access or intelligence | Competition from other exporters |
|-------------------------|--------------------|----------------------------|---------------------|---------------------------------------|----------------------------------|
| Correlation Coefficient | 1.000              | -.697**                    | .357**              | -.091                                 | -.437**                          |
| Sig. (1-tailed)         | .                  | .000                       | .002                | .224                                  | .000                             |
| N                       | 50                 | 50                         | 50                  | 50                                    | 50                               |
| Correlation Coefficient | -.697**            | 1.000                      | -.357**             | -.212*                                | .134                             |
| Sig. (1-tailed)         | .000               | .                          | .002                | .038                                  | .131                             |
| N                       | 50                 | 50                         | 50                  | 50                                    | 50                               |
| Correlation Coefficient | .357**             | -.357**                    | 1.000               | .160                                  | -.216*                           |

|                         |         |        |        |        |        |
|-------------------------|---------|--------|--------|--------|--------|
| Sig. (1-tailed)         | .002    | .002   | .      | .099   | .041   |
| N                       | 50      | 50     | 50     | 50     | 50     |
| Correlation Coefficient | -.091   | -.212* | .160   | 1.000  | .654** |
| Sig. (1-tailed)         | .224    | .038   | .099   | .      | .000   |
| N                       | 50      | 50     | 50     | 50     | 50     |
| Correlation Coefficient | -.437** | .134   | -.216* | .654** | 1.000  |
| Sig. (1-tailed)         | .000    | .131   | .041   | .000   | .      |
| N                       | 50      | 50     | 50     | 50     | 50     |

#### INTERPRETATION

In the above table the correlation analysis displays the relationships between various response categories. Respondents who strongly disagree are unlikely to also disagree, as evidenced by the strong negative correlation between strongly disagree and disagree (-0.697,  $p = .000$ ). There is some overlap between Strongly Disagree and Neutral, as evidenced by their moderately positive correlation (0.357,  $p = .002$ ). There is no significant difference between Strongly Disagree and Agree (-0.091,  $p = .224$ ). People who strongly disagree are less likely to strongly agree, according to a moderately negative correlation (-0.437,  $p = .000$ ) between strongly disagreeing and strongly agreeing. Consistency in responses is indicated by the strong positive correlation (0.654,  $p = .000$ ) between Agree and Strongly Agree, which is also evident for other categories.

**TABLE 10: SHOWING THE ANNOVA ANALYSIS OF EXPORT CHALLENGES FACED DURING EXPORTING**

|                      |                | Sum of Squares | df | Mean Square | F      | Sig. |
|----------------------|----------------|----------------|----|-------------|--------|------|
| Infrastructure       | Between Groups | 3.447          | 3  | 1.149       | 2.743  | .054 |
|                      | Within Groups  | 19.273         | 46 | .419        |        |      |
|                      | Total          | 22.720         | 49 |             |        |      |
| Transportation costs | Between Groups | 33.818         | 3  | 11.273      | 83.882 | .000 |
|                      | Within Groups  | 6.182          | 46 | .134        |        |      |
|                      | Total          | 40.000         | 49 |             |        |      |
| Storage facilities   | Between Groups | 3.447          | 3  | 1.149       | 2.743  | .054 |
|                      | Within Groups  | 19.273         | 46 | .419        |        |      |
|                      | Total          | 22.720         | 49 |             |        |      |
| Custom clearance     | Between Groups | 33.818         | 3  | 11.273      | 83.882 | .000 |
|                      | Within Groups  | 6.182          | 46 | .134        |        |      |
|                      | Total          | 40.000         | 49 |             |        |      |
| Financial assistance | Between Groups | 33.818         | 3  | 11.273      | 83.882 | .000 |
|                      | Within Groups  | 6.182          | 46 | .134        |        |      |
|                      | Total          | 40.000         | 49 |             |        |      |
| Government Policies  | Between Groups | 33.818         | 3  | 11.273      | 83.882 | .000 |

|                            |                |        |    |        |        |      |
|----------------------------|----------------|--------|----|--------|--------|------|
|                            | Within Groups  | 6.182  | 46 | .134   |        |      |
|                            | Total          | 40.000 | 49 |        |        |      |
| Schemes and Subsidies      | Between Groups | 33.818 | 3  | 11.273 | 83.882 | .000 |
|                            | Within Groups  | 6.182  | 46 | .134   |        |      |
|                            | Total          | 40.000 | 49 |        |        |      |
| Market access              | Between Groups | 3.447  | 3  | 1.149  | 2.743  | .054 |
|                            | Within Groups  | 19.273 | 46 | .419   |        |      |
|                            | Total          | 22.720 | 49 |        |        |      |
| Seasonal Fluctuations      | Between Groups | 15.884 | 3  | 5.295  | 20.930 | .000 |
|                            | Within Groups  | 11.636 | 46 | .253   |        |      |
|                            | Total          | 27.520 | 49 |        |        |      |
| Packaging and Preservation | Between Groups | 3.447  | 3  | 1.149  | 2.743  | .054 |
|                            | Within Groups  | 19.273 | 46 | .419   |        |      |
|                            | Total          | 22.720 | 49 |        |        |      |

## INTERPRETATION

In the above table while not statistically significant, some comparisons (e.g.,  $F = 2.743$ ,  $p = .054$ ) are close to significance and point to potential differences that might need more research or a larger sample. Other comparisons (e.g.,  $F = 83.882$ ,  $p = .000$  and  $F = 20.930$ ,  $p = .000$ ) show strong differences between groups that are unlikely to be the result of chance, and they are highly significant ( $p < .001$ ). The fact that there is significantly more variation between groups than within is further supported by large F-values.

## FINDINGS

➤ **Experience Distribution:** Mid-level and highly experienced professionals are evenly distributed, with 88% having five or more years of experience. Just 12% have less than five years, which suggests either high retention or low new hiring.

➤ **Production Scale:** 52% fall into the highest category (1000+ metric tons), while 90% produce 500+ metric tons. Ten percent are small-scale producers (less than 500 metric tons).

➤ **Experience-Based Fluctuations:** Responses from groups with more than ten years of experience vary the most, whereas those with less experience are more reliable.

➤ **Support by Production Scale:** Large producers profit from government policies and technology, mid-sized businesses concentrate on infrastructure and training, and small producers depend on financial aid.

➤ **Storage Requirements:** While mid-sized producers depend on cold and ambient storage, large producers use ambient/on-site storage.

➤ **Support by Experience:** Highly skilled people rely on government programs and technology, mid-

level professionals prioritize infrastructure and training, and less experienced people favor financial aid.

➤ **Industry Challenges:** Cold storage (2.24), warehouse storage (3.28), and infrastructure (1.80) are the main issues. Tariffs, transportation, and market strategies are less urgent.

➤ **Principal Issues:** The main problems are inadequate infrastructure (2.86), low tech awareness (2.50), and a lack of technical skills (2.80). Although not the main factor, cost (2.94) is significant. The least worrisome factor is government support (3.90).

➤ **Analysis of Correlation:** Response consistency is ensured by a strong positive correlation (0.654) between Agree and Strongly Agree and a strong negative correlation (-0.697) between Strongly Disagree and Disagree.

➤ **ANOVA Results:** Strong group differences are confirmed by some results ( $F = 83.882$ ,  $p = .000$ ,  $F = 20.930$ ,  $p = .000$ ), while others ( $F = 2.743$ ,  $p = .054$ ) are close to significance. Significant variation between groups is indicated by large F-values.

## SUGGESTIONS

For 12% of the workforce, organizations should concentrate on mentorship programs, and for more seasoned workers, succession planning. Large businesses gain from policy and technology support, mid-sized businesses need infrastructure and training, and small businesses need financial assistance. While large producers rely on bulk storage and on-site facilities, small and mid-sized producers need cold storage. The three main issues that demand priority investment are infrastructure, storage, and cold storage. Digital tool and automation training is required, and subsidies should be used to lower cost barriers. Funding for small businesses and policy support for larger ones should be based on experience levels. While highly significant results validate important policy focus areas, some trends require larger sample sizes for validation.

To increase recruitment, concentrate on offering competitive benefits, skill development opportunities, and mentorship programs to draw in new hires. To guarantee seamless leadership changes and knowledge transfer, place a strong emphasis on succession planning. Small businesses (less than 500 metric tons): Offer grants and loans to sustain operations and promote expansion. Mid-Sized Companies (500–1000 metric tons): Put an emphasis on training initiatives and infrastructure improvements to boost productivity and foster leadership. Large Businesses (>1000 metric tons): Assistance with technological solutions and government policies that promote R&D, automation, and innovation. Cold Storage: Infrastructure for cold storage and refrigerated logistics must be invested in by smaller and mid-sized producers. Bulk Storage: Investments in warehouse optimization and bulk storage are necessary for large producers.

Funding should be given top priority to cold storage capacity and infrastructure development, particularly for smaller producers. Market Strategies & Tariff Barriers: Use trade agreements and export subsidies to address tariff barriers and market access. Training Courses: Emphasize Industry 4.0 technologies, automation, and digital tools. Technology Affordability: To assist small and mid-sized enterprises in implementing cutting-edge technology, offer financial options or subsidies. Small Businesses: Keep offering tax breaks, grants, and loans as financial assistance. Big Businesses: Provide incentives for sustainability, automation, and R&D. Larger sample sizes and more thorough analysis are necessary for certain statistical trends in order to validate and direct the creation of policy.

To sum up, a multifaceted strategy is required, addressing major issues in infrastructure, storage, and cold chain management while providing support that is customized based on the size of the company, experience level, and technological advancement.

## CONCLUSION

According to the data, 88% of professionals with more than five years of experience are retained at a high rate. 90% of entities produce more than 500 metric tons, and more than half (52%) produce more than 1000 metric tons, indicating a trend toward large-scale production. Just 10% of manufacturers are smaller, which furthers the dominance of large-scale businesses.

## Obstacles and Support Networks:

For smaller businesses, financial aid is essential, but for mid-sized businesses, infrastructure and training are top priorities. Instead of receiving direct financial or training assistance, large businesses rely on government regulations and technological advancements. Due to economies of scale, large producers prefer ambient and on-site storage, while mid-sized producers use a combination of ambient and cold storage.

## Primary Industry Issues:

The most urgent issue is infrastructure (1.80), which is followed by cold storage (2.24), and warehouse (3.28). Less urgent concerns include tariffs (5.68), transportation (6.36), and market strategies (5.56). Low technological awareness (2.50), a lack of technical know-how (2.80), and inadequate infrastructure (2.86) are the primary obstacles to advancement. Although it is a factor, cost is not the main problem.

## Statistical Perspectives:

Professionals with less than ten years of experience exhibit few variations, whereas highly experienced professionals exhibit the greatest fluctuations. Strong agreement between related categories is indicated by correlation analysis, which shows consistent response

patterns (e.g., Agree and Strongly Agree: 0.654,  $p = .000$ ). Strong variation between categories rather than within is supported by the statistically significant differences between groups ( $F = 83.882$ ,  $p = .000$ ) found in the ANOVA results.

Overall, the results highlight how crucial government regulations, technological developments, and customized support systems are to maintaining large-scale production and resolving industry issues.

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