

## EXPLORING THE BENEFITS OF EXPORTING FRUITS AND VEGETABLES FROM INDIA TO THE UAE AND STRATEGIES FOR WASTE REDUCTION AND RESOURCE ALLOCATION

Pallavi Nilesh Patil<sup>1</sup>, Prof. (Dr.) B. Murali Manohar<sup>2</sup>, Prof. (Dr.) Prathapan Kesava Pillai<sup>3</sup>

DOI: <https://doi.org/10.36893/APER.2025.V18I01.197>



### Abstract:

Featuring an emphasis on waste reduction and resource allocation strategies, this study evaluates the fiscal benefits of exporting fruits and vegetables from India to the United Arab Emirates. India's varied agricultural output gives it a competitive edge in supplying the UAE's need for fresh produce, which is fueled by the country's dependence on imports because of its low agricultural capability. India's agricultural sector can benefit from strengthening trade links by raising farmer incomes, generating employment, and boosting foreign exchange profits. The difficulties of post-harvest losses, ineffective supply networks, and resource misuse are highlighted in this review. It emphasizes how crucial it is to implement cutting-edge cold storage, environment friendly agricultural methods, and contemporary logistics in order to minimize waste and maximize resource use. Overcoming regulatory obstacles requires cooperation between the public and private sectors as well as stakeholders in both countries; in this case, a special economic zone may be a key instrument. Digital Public Infrastructure for Trading and e-Retailing, as well as Fruit and Vegetable Packaging Issues, can overcome inadequate marketing infrastructure. By maximizing the benefits of exporting Indian products to the United Arab Emirates, reduce post-harvest loss, waste utilization of the fruit processing industry, and enhancing quality standards, resource optimization may ensure economic growth.

Keywords: Digital Public Infrastructure, Post-harvest, Special Economic Zone, Infrastructure, logistics.

## **1. Introduction :**

India, plays a vital role in the global agricultural economy as one of the largest growers of veggies and fruits internationally. Different types of fresh veggies and fruits are available due to India's varied climate. After China, it is the world's second-largest producer of fruits and vegetables. Around 2021–2022, India produced 107.24 million metric tons of fruits and 204.84 million metric tons of vegetables. Vegetables were farmed on 11.351 million hectares, while fruits was grown on 7.051 million hectares. [1].The demand for fresh, premium product is rising quickly worldwide, which has led to a considerable expansion in India's export sector. Given its high reliance on imported agricultural products as a result of limited domestic output and a growing population, the United Arab Emirates (UAE) stands out as a viable destination among its major trading partners. The significance of this trade connection is also significantly increased by the UAE's advantageous position and sophisticated logistical infrastructure, which serve as a gateway for re-exports to other Middle Eastern and African markets.

One of the main agricultural products that India exports to the United Arab Emirates is rice, especially Basmati rice. In addition to that, Indian fruits and vegetables, both fresh and dried a sizable market in the United Arab Emirates. Fruits, vegetables, flowers, seeds, tea, coffee, and spices are all considered horticultural goods [2]. But in addition to export prospects, India also has to deal with the serious problem of losses following the harvest, where 28–42% of food is thrown away every year as a result of inadequate transportation and storage. Effective methods for reducing post-harvest losses and increasing the lifespan of products are required, as post-harvest losses still occur and vary from 5% to 16%. Addressing these losses through effective waste reduction and resource allocation strategies is essential to maximize economic benefits and ensure food security[3].

For a better future, organized retailers are preparing India's food supply networks. These natural resources can be turned into a benefit if used appropriately. But the route is replete with obstacles and difficulties. In order to completely comprehend the difficulties in supply chain management, as well as to find areas for development and minimize a number of supply chain inefficiencies, there is a need for extensive research in the field. [17]Researchers have a great opportunity to rise to the challenge and create a body of knowledge that will assist corporations, governments, and cooperatives in carrying out their duties by efficiently managing supply chains.

## **2. Mutual Benefits of Exporting Fruits and Vegetables:**

### **2.1 Indian Diaspora in UAE:**

Immigrants generate demand for goods from their native countries, which affects imports. When it comes to differentiated items, the connection is strong since the "taste" component influences the choice to consume. [4] Due to its direct impact on the factor food market, the increased international trade brought about by immigration can improve welfare through reliable supply chain.

The recent policies has led new scenarios for upcoming years. An estimated 1 million jobs will be created in India as a result of the CEPA's increase in the export of labor-intensive goods. Additionally, by 2030, the UAE plans to issue 140,000 visas to highly qualified Indian workers.[5]

Additionally, it will provide for a 90-day visa for Indian business travelers and contractual suppliers, as well as a three-year visa for intra-corporate transferees.[6] This data predicts that Indian Diaspora in UAE is set to increase exponentially, today counting to 3.5 million. About USD 13745 million, or 19% of the total remittances received, came to India from the Indian diaspora in the United Arab Emirates. [7], the reliable and continuous supply of Good Quality of fruits and vegetables will lead to the sustainable bilateral relation and Drive progress.

## **2.2 Drive advancements in food and beverage Industries in UAE:**

Food and beverage Industries in UAE accounting to about 2000 of which about 550 companies seek fruits and vegetables as raw materials. Because the United Arab Emirates produces very few intermediate, commodity, and weakly processed agricultural products, the country's food processing industry is primarily dependent on imported ingredients. Despite this stage, their suppliers' adaptive capabilities—which make it possible to react instantly and adapt, are being prioritized by organizations and collaborate on improving product development and other skills using their technology and ideas.[8] And as UAE being latest transit hub to MENA region The UAE has become a major hub for food trade, enabling the flow of food items throughout the regional market and For its operations, the food processing industry mostly relies on imported goods and materials.

Here enters the opportunity for both the countries as a win-win situation. The need of raw material in form of vegies and fruits for about 25 % of the food and beverage industries perfectly matches with the overproduction of it in India. Even their being many other competitors as Russia, Canada, USA and Argentina [9]. India being at just 1416 nautical miles, can assure the reliable and uninterrupted supply of fruits and vegies to these Industries along with cost effectiveness due to least tariff as mentioned above.

## **2.3 To override Food Security among Gulf Cooperation Council (GCC) countries :**

The GCC nations are India's top trading partners. In order to assure food security, The GCC nations have moved away from the a patriot goal of self-sufficient food supplies to adaptive and comprehensive farms approaches, like reliance on imports. And as The main products of SAARC's 80% of SAARC exports to the GCC are wheat and rice. Here, the numbers can be improved if the proportion of fruits and vegetables rises. This will lessen food security worries across the GCC as a whole, not only in the United Arab Emirates [10]. Owing to security reasons in Red sea region which were global concern in Nov 2023, UAE can be considered as the most safe porting station to form uninterrupted supply chain to UAE followed by GCC countries. The food security issue can be overcome by allocation of resources rightly.

## **2.4 Job Creation in India :**

Food item exports demonstrate a good relationship with job expansion. The workforce expansion for these economies' fruit and veggie sectors has been assisted by a number of organizations. Initiatives for workforce development actively involve the private sector. This is encouraged by the significant effect that training has on employees' productivity. The majority of training is completed on the job, and businesses, not individual workers, pay for it.[11] Further, Our

competitive and comparative advantage in the global trade market is impacted by supply limitations, yield disparities, and high logistical expenses. The growth of the horticulture industry is the main focus of the lessons learned from other emerging nations. [12]. This can be achieved by increasing the organized participation of small and marginal farmers and providing them with entrepreneurship training. This will create both direct and indirect employment opportunities for agricultural labourers involved in planting, sorting, grading, harvesting, and packaging.

### **2.5 Cultural and Culinary Exchange:**

Bilateral trade between India and the United Arab Emirates (UAE) has had a long tradition that dates back to the barter era, when grains were traded for dried fruits and pearls for cotton. With the interchange of ideas, goods, and culture over the years, this bond became more solid. Over the years, India has found the UAE to be a significant hub for re-exports in addition to oil commerce. With a correlation coefficient of  $r \geq 0.9$ , edible fruits and nuts are among the 25 commodities with the highest connection [13]. New waves of interconnectedness between countries and regions that produce and consume offer chances to create a more thorough strategy that highlights social and spatial heterogeneity as key aspects of globalization. [14]

### **3. Challenges**

In India the Focused areas of Export are service sectors, Electronic, Pharmaceutical sector and many more but less focus is Given for Development of Export of Agriculture Products. The Vegetables and fruits production done by farmer, putting all his resources; be it manpower, land, fertilizer, tools; to produce the Best quality fruits and vegetables. But here the challenges arrives to store it and increase the shelf life. As this goods are to be sold not just in local markets but surplus produce can be sold to neighboring countries. A shift of our Interest in Trading partners from other countries to UAE, which is comparatively highly populated including the demand of Indian Produce by the Indian diaspora can led to regular supply of farm products. As being Vivid scenario of opportunity, the willingness of Private firms to invest at different levels in storage and supply chain is what feels like major challenge. After having insight in wastage of farm produce, It is estimated that about 1.3 billion tons of food, valued \$165.2 billion is wasted world wide of which 42% of farm produce in India is wasted which is estimated value is 50,000cr. Agricultural residue, processed food, fruit and vegetable processing, marine food, dairy processing, meat and poultry processing, hotel and restaurant. [15], etc. are some of the major categories of food waste that are produced This is because farm produce is not at Right place on Right Time. Which face challenges from Infrastructure for marketing, Packaging Issues of Fruits and vegetables, Inadequate cold storage facilities, Fragmented supply chain and most Importantly The Lack of Digital Public Infrastructure dedicated for Agricultural- Products sale for both local and global market.

#### **3.1. Inadequate infrastructure for marketing:**

One of the main limitations in the system of production and disposal is the marketing of horticulture products, which also plays a significant part in marketing the feasible for the industry. Commission agents are primarily used to market fruits and vegetables. Cooperative marketing societies handle a very tiny percentage. When it comes to certain fruits, the pre-harvest contractors'

owners also auction off flowers and vegetables.[16] Consolidation centers organize the transportation of vegetables from these facilities to the hub, and both trucks with and without air conditioning are utilized. The contract agricultural areas provide direct distribution to the hubs. Effective fleet management has made this issue more challenging because of the comparatively high cost of logistics and the unpredictable delivery time [17].

### **3.2. Packaging Issues of Fruits and vegetables:**

With Given the characteristics of fresh produce, packaging plays an important role in their SC processes. Fresh fruit and vegetable packaging mainly aims at fulfilling the demands of customers for product quality and freshness while preventing food loss and preventing both farmers and companies financial losses. Another important factor to consider into is the packing material. Many factors, including the packaging process, the material selection, and the recycling and/or reuse of the material, need to be taken into consideration in order to satisfy sustainability standards. Packaging operations are essential for the transportation and preservation of goods, but they also generate a significant quantity of trash. Problems with packaging are worthy of their own subsection. This chapter covers nearly every topic pertaining to food safety and freshness, as well as issues with stocking and transportation, sustainability, etc. Therefore, efforts are being made to maximize the effects on the economy and ecology as well as the freshness of the food[18]. For nearly twenty-five years, researchers have examined the advantages and disadvantages of using polymeric sheets to package fresh produce. Plastic films affect the commodity's rates of heat and cooling, so they need to be taken into account when choosing the best temperature-management strategies for a packaged commodity. Produce wrapped in film frequently requires longer to cool than produce that is not wrapped in film; however, this disparity can be minimized by perforation of the film. The potential to feed water condensation inside the box, which might foster fungus growth and aggravate decay issues, is another major drawback of film wrapping. During postharvest handling, when the product is transported from low storage temperatures to high ambient temperatures, this type of condensation is likely to happen.[19]

### **3.3 Waste utilization of fruit processing industry**

The world's largest fruit farmer is India. In contrast to wealthy nations, fruits are used for processing only 1.8% of the entire crop. The creation of various processed goods and the generation of varied wastes are the activities of the different sectors of the food processing industries. These wastes, whether liquid or solid, directly harm producers and cause environmental contamination if they are not managed effectively. One of the most difficult issues facing both India and the rest of the world today is the waste utilization of fruit processing industry.

. Through various extraction, purification, and fermentation processes, The by-products are extensive in valuable compounds that can be used in many different industries as natural, inventive, and cost-effective sources of natural acids, pectin, carbohydrate, antioxidant substances, amino acids, dietary supplements, essential fatty acids, and many other substances. The antibacterial and antioxidant properties of waste products released into the environment are excellent. These are new, affordable, and natural sources of antioxidants and antimicrobials that can be utilized to stop diseases brought on by harmful bacteria. Many industrial fruit wastes have been used to produce biogas, which helps industrial sectors meet their electrical needs.

. Countries looking to integrate minimal waste technologies into their agribusiness must meet the desire and requirement of fully utilizing horticulture produce. Characterizing some of the significant bioactive chemicals found in fruit residues and creating formulations based on these components that can be used as health foods would require studies and research. Three categories of practical measures are referred to as waste prevention: product reuse, reduction at the source, and strict avoidance.

. This review's objectives are to promote the full utilization of the by-products rich in bioactive components and to highlight the possible applications of a few selected fruit by-products that are created during fruit processing. It does this by compiling past research and current opportunities about the potential use of by-products from various fruit processing companies .[20]

### **3.4 Fragmented supply chain**

Numerous fruits and vegetables, as well as 20–60% of the total production, are lost or discarded at different supply chain operational levels . In the agri-fresh produce supply chains (AFPSCs), post-harvest loss and waste of fruits and vegetables are mostly caused by harvesting, sorting, grading, improper storage, handling, and transportation (Murthy et al., 2009). The loss is over three times the new agriculture budget, which increased by 44 percent from Rs 24,908 crore (\$4 billion) in 2015–16 to 35,985 crore (\$5 billion) in 2016–17. [21] The fragmented sector makes it financially unfeasible to invest in and employ new technology involving considerable spending.[22]

### **3.5 Post-Harvesting Loss**

Every year, the production of horticulture reaches unprecedented heights. India is currently the world's second-largest producer of vegetables, after China. However, poor handling and management lead to massive postharvest losses and waste. One of the biggest obstacles to guaranteeing food security on a worldwide scale has been postharvest loss. Given that food waste contributes to global warming and that 10 millions of people globally suffer from chronic diseases, and under nutrition, this waste appears immoral. Fresh vegetables spoil quickly.

. Their storability and marketing window are further diminished by improper transportation, particularly with regard to temperature control during storage and transit. By 2030, the second Sustainable Development Goal of the UN is to cut food losses by half. To improve the storability of fresh vegetables, a number of strategies have been used globally, involving the use of edible coatings, temperature and storage environment control, value addition, particularly drying technologies, and different anti-senescent compounds such polyamines, salicylic acid, NO, 1-MCP, Methyl Jasmonate (Me JA), etc. This paper aims to provide a broad overview of postharvest losses and potential approaches to managing and minimizing vegetable losses [23]

## **4. Effective Solutions to Gain momentum in Export**

Fruit and vegetable exports are vital to India's economy since they boost agricultural growth and improve farmers' standard of living. Thanks to its diverse agro-climatic system, India, the second-

largest producer of fruits and vegetables in the world, enjoys an advantageous position in global markets. Important facets of this significance are highlighted in the sections that follow.

#### 4.1 Global Market Dynamics

India's strategic commercial partnerships are reflected in its major export destinations, which include the UAE, Bangladesh, and the Netherlands. The long-term view is still optimistic despite obstacles like the COVID-19 pandemic's effects on supply chains, which highlights the necessity of better postharvest management

##### 4.1.1 Competitive Advantage

Comparative advantages in certain items, such as onions and cucumbers, were demonstrated by India's exhibits, indicating the possibility of improved market placement. Improving export performance and accessing profitable markets require an emphasis on value addition, especially in processed goods ("Export Potential of Fruits for Boosting Secondary Agriculture in India", 2024). On the other hand, although the export industry exhibits potential, issues like uneven growth rates for specific goods, such as mangoes, underscore the necessity of strategic enhancements in production and marketing to maintain competitiveness in the global market. From 2006–07 to 2021–22, secondary data on fruits, vegetables, and fruit and vegetable products was gathered. According to the findings, grapes (8.18 and 18.70%), pomegranates (7.91 and 19.15%), oranges (7.30 and 17.98%), garlic (7.26 and 17.61%), potatoes (12.59 and 21.56%), watermelon (11.75 and 21.19%), green chili (9.03 and 20.70%), and other fresh fruits (7.06 and 16.54%) all had positive and significant growth rates in the CAGR for the export of fruits and vegetables in terms of quantity and value. However, mangos have a negative growth rate of -5.26% in terms of quantity, while oranges have the greatest instability index at 75.53 and 74.42, respectively. The CAGR for the export of fruit and vegetable products in terms of quantity and value is as follows: raisins (41.00 and 50.48%), prepared and preserved potatoes (36.85 and 40.64%), other vegetable products (betel leaves and nuts) (15.28 and 23.09%), processed fruits, juices, and nuts (10.15 and 18.76%), dried and powdered onions (6.71 and 15.06%), processed vegetables (5.41 and 14.04%), fruits and vegetables seeds (4.79 and 16.93%), guar gum (4.73 and 8.32%), mango pulp (3.63 and 2.33%), and cucumber and gherkins (prepared and preserved) (1.03 and 8.71%). However, walnuts have a negative and substantial growth rate of -9.97 and -7.51 percent, whereas prepared and stored potatoes and guar gum had the greatest instability indexes, at 67.98 and 105.79 percent, respectively.

Thus, the global demand for veggies and fruit products, the increased production of fruits and vegetables, and the competitive pricing in the global market have all contributed to the absolute rate of expansion. This will help farmers and other stakeholders along the agricultural value chain, boost economic growth, and reduce the risk of exporting in the future. It will also allow India to continue expanding its market share globally. [24]

India's varied agro climatic conditions make it one of the world's top producers of fruits and vegetables, second only to China. However, due to its perishability, 20–30% of the crop is squandered. Because processed fruits are in high demand abroad, they are the most convenient to store and export. The increase and volatility of India's various processed fruit exports from 2001–02 to 2022–23 were therefore examined in this study. Exports boosted the total growth rate,

according to the Compound Annual Growth Rates, with jam, jelly, and marmalades growing at a greater rate (12.1 percent), followed by dried fruits (9.2 percent) and mango pulp (0.08 percent) in terms of quantity exported.

. The Cuddy-Della Index for processed fruit export values (MT) was used to compute the instability. The Index value of 26.17 percent indicated that the mango pulp category exhibited significant levels of export instability overall. [b]On the other hand, the percentages of instability for jam, jelly, marmalades, and dried fruits were 23.85 and 24.81 percent, respectively. This study concluded that suitable horticultural commodity infrastructure, cold chain, and supply chain should be established for destination-specific manufacturing of processed fruits in order for India to compete with foreign exporters and explore new alternative markets for the produce. [25]

India's fruit and vegetable exports are necessary for supporting secondary agriculture and raising farmers' standard of living. Fresh fruit exports brought in ₹5,658.9 crore in 2022–2023, while processed fruit exports brought in ₹5,944.49 crore, indicating substantial development potential. Value addition is essential since it significantly boosts export earnings, especially in processed goods like mangoes. Important markets like the U.K. , the Netherlands, and the United Arab Emirates emphasize how crucial these exports are for boosting agricultural development and diversifying revenue streams.[26]

#### **4.2 . SPECIAL ECONOMIC ZONE (SEZ) :**

Now that policymakers have realized how important it will be to boost the food processing sector for "enlargement with integration and food security" in the country, the Indian government has changed its policies. Their efforts to promote the sector more broadly and systematically. The special economic zone can be one of the major tool to achieve it. When compared to the home economic environment, these zones' advantages include more lenient economic regulations, efficient customs procedures, expedited registration and licensing, and superior and more dependable infrastructure, including roads, electricity, and water.[27]. Such initiative are not new but were been taken in 1992-93 in form of model for a food park . with the intention of supplying the food processing industry, particularly small and medium-sized business owners, with shared infrastructural facilities.The plan assigned state governments the responsibility of accountability for promoting parks or industrial developments used for food processing. The Food Park serves as a business park for food and agricultural enterprises, including shared amenities such cold storage facilities and analytical and quality control labs. Around 41,000 direct and indirect jobs must be created by each metro food park, which must directly support at least 6,000-6500 farmers or producers and indirectly benefit 25,000–30,000 farmers.[28]

##### **4.2.1Key locations with reliable infrastructure:**

Most of central SEZ are all multi-product , whereas state Government /Private economic zones shows some contrast to it with having some of SEZ for Gems and Jewellery , Handicraft , Electronic Hardware and many more but none is dedicated to Agro-based products.[29] The Mangalore Central Market in Karnataka is next to the New Mangalore Port, and the Vashi Agricultural Produce Market Committee (APMC) is located in Navi Mumbai, next to the JNP port.,Trivandrum Chalai Market near Cochin Port which also

supplies Agro-based products to Maldives. Most of these ports can be brought under SEZ for reducing the wastage of Agri-products.

#### **4.2.2 Strong connectivity to Hinterland :**

As a major hub for trade and an essential component of global supply networks, a seaport needs to have strong access to its hinterland, where traded products are either processed or consumed. In this sense, a nation's or region's port has a significant impact on its logistical performance. Ports are said to have efficient hinterland connectivity if they can efficiently and affordably connect to a large number of inland locations. However, a port's interaction with its hinterland cannot be solely based on figures. If we consider the frequency of transport services along the linkages to distinct hubs for shipping between the hinterland and the seaport, a clear picture of the potential connectivity between ports and their hinterlands may become apparent.[30]

#### **4.3. Digital Public Infrastructure for Trading and e-Retailing of Fruits and Veggies :**

There are around 43,200 recurring market places in India. Sabzeemandis (fruit and veggies markets), specialty shops, and street sellers who sell from baskets, bicycle carts, and handcarts are all examples of traditional fruit and vegetable selling in India. Conventional Higher time consumption and spatial scattering are characteristics of selling in FFV. Several middlemen and lengthy cycle periods are involved in the traditional market channel's distribution of certain commodities. It is crucial to connect farmers with markets directly in order to increase their margin in the consumer rupee. For doing so Electronic National Agriculture Market was being Introduced by Indian government . Through the virtual national agribusiness market, a pan-Indian online trading platform, the existing APMC mandis are connected to create a single national market for commodities related to agriculture (National Electronic Agriculture Market, 2016). It facilitates online commodity trading in the nation for farmers, merchants, and buyers. The objective is to offer better support. price discovery and provide tools to guarantee effective marketing of their supply. The goal of eNAM is to unify 585 APMCs, or regulated wholesale markets, onto a single electronic platform. As a result, farmers will be able to sell their produce to the highest bidder. Ensuring transparency in the purchase and sale of agricultural goods is the primary goal of eNAM. [31] To solve the problem and improve transparency, the processing platform should be redesigned to link supply chain participants. In order to guarantee quality, packaging, and safety concerns, it must also guarantee full produce traceability from fields to markets.

#### **5. Discussion on growth and Instability of fresh fruit items**

India's fruit and vegetable exports are essential to the country's economic expansion since they boost farmers' incomes and the agricultural value chain. According to the survey, rising production and global demand are driving notable export growth rates. Stakeholders gain from this expansion since it increases India's visibility in the international market and provides competitive pricing. Furthermore, it reduces export risks, guaranteeing farmers a steady income and advancing the nation's economy as a whole.

.[32]

For India, fruit and vegetable exports are essential since they boost the nation's economy by meeting the growing demand worldwide. India is a major player in the worldwide vegetable market and ranks second in terms of output, selling to nations like the United Arab Emirates, the United States . Improvements in cold chain infrastructure and enabling government regulations aid the horticulture industry by lowering post-harvest losses and boosting market competitiveness, which in turn promotes economic expansion and agricultural innovation. India is the world's second-largest exporter of fruit, after China. Table 2 indicates that all of the major importing countries have favorable and substantial growth with a moderate instability index, with the sole exception of Bahrain, which had a very high instability rating (256%) and positive but marginal growth of 5.94 percent. India had a low instability rating (19%) and positive, noteworthy development of 8.72% annually

**Table 2. Growth and instability of fresh fruits items in major countries: 1991-92 to 2019-20**

<b>Name of countries</b>	<b>CGR (%)</b>	<b>Instability Index (%)</b>
Bangladesh	5.949***	37.497
UAE	7.466***	24.541
Saudi Arab	5.742***	25.015
UK	6.603***	23.490
Bahrain Is	5.945	265.520
Nepal	28.958***	62.588
Total export	8.727***	19.075

*Note: \*\*\* indicates significance at a 1 percent level*

**Table 5. Growth and instability in import of agricultural commodities: 1991-92 to 2019-20**

<b>COMMODITY</b>	<b>CGR (%)</b>	<b>Instability index (%)</b>
Fruits	8.60***	18.92
Vegetables	12.60***	98.48

*\*\*\* indicates significance at a 1 percent level*

Fresh and processed fruit and vegetable exports are growing at a good and noteworthy rate, and their low and moderate instability index suggests that the worldwide market is less volatile. On the other hand, because it is less expensive to import exotic fruits and vegetables than to produce them, imports of these foods are increasing at a positive and noteworthy rate. Even though they are among the biggest producers The real image of fruits and vegetable exports is shown by Revealed Comparative Advantages, which also highlights drawbacks during the study period. India is still having trouble competing in the international export market for fruits and vegetables because of a lack of knowledge, technology, and innovative processing techniques. [33]

## **6. Scenario of production of fruits and vegetables in India as to Export :**

### **6.1 Discussion for fruits Production in India :**

With the total estimated fruits Production cumulated for all states being 112730.04 metric tones. The apparently most fruits Producing state are Andhra Pradesh , Maharashtra , Uttar Pradesh , Madhya Pradesh and Gujarat ; of which Maharashtra has shown an impressive Growth Rate of 23.55% . The Growth of Production in Tamil Nadu , Madhya Pradesh and Uttar Pradesh has also

been successive. As Most of fruit crop Grown is Mango followed by Citrus Fruits and Banana; by area. The Productivity gives completely different scenario. The Banana leads in Production and other two being Mango and citrus fruits successively. As after self consumption in India a significant amount of fruits can be exported . The Research by [34] shows that UAE govt. has focused on quality of local organic fresh food and thus leading to Perception building of people as; seeing the organic and fresh fruits and farm products . This is in fact a Govt. induced Public Demand for Organic and fresh fruits over the Processed Junk food ; for which the Fig.1 shows the Potential of India to fulfill it.

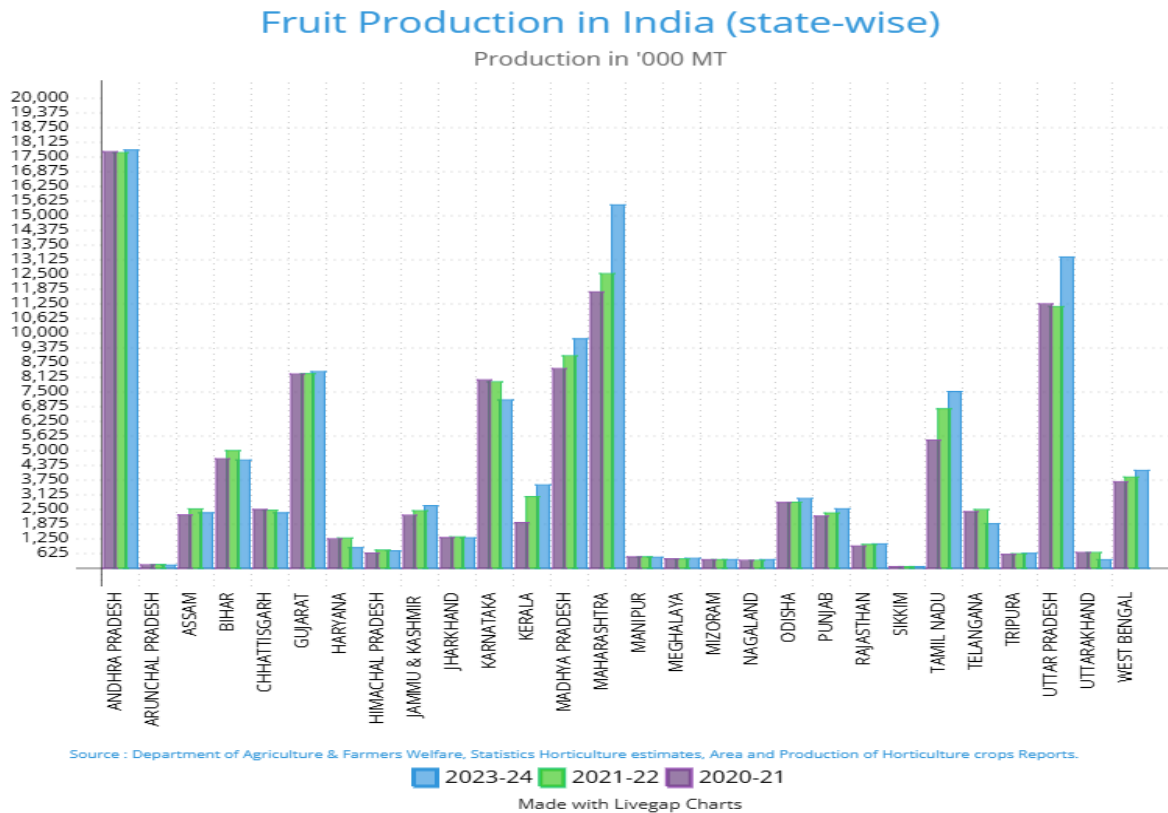


Fig.1. Fruit Production in India (state wise)

### 6.2 Discussion for Vegetable Production in India :

With Total estimated Vegetable Production for 2023-24 , of all states being 205799.18 metric tones. Apparently the most Vegetables Producing state are Uttar Pradesh , West Bengal , Madhya Pradesh , Maharashtra and Bihar. Of which Uttar Pradesh has shown Growth Rate of 5.6% . The Growth of Production in other states has also gained ground in past few years as shown in Fig.2 . The category of other fresh produce had the largest compound annual growth rate in terms of exported quantity (10.83%) among the various veggie components, while seeds from veggies had the highest compound annual growth rate in terms of exported value (18.85% annually). Onions account for 56.87 percent of the total. Other fresh vegetables (25.15%), processed veggies (10.48 percent), cucumbers and gherkins (7.25%), and seeds from veggies (0.29%) follow [35]. Over the past ten years, vegetable exports have accounted for 2.15 percent of global vegetable production.

Bangladesh was the top importer of Indian onions in terms of value, followed by the United Arab Emirates for all other vegetables. Indian Farmers' knowledge of export requirements and high-quality vegetable output, as well as the expansion of infrastructure for vegetable export.

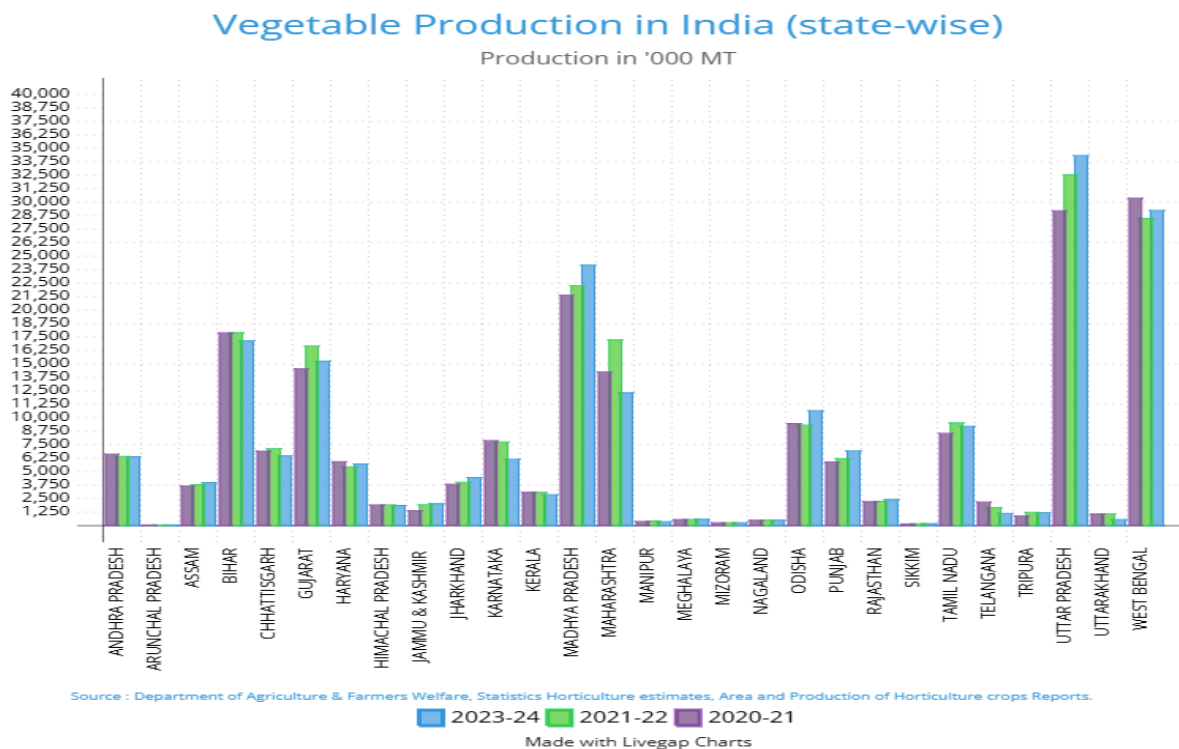
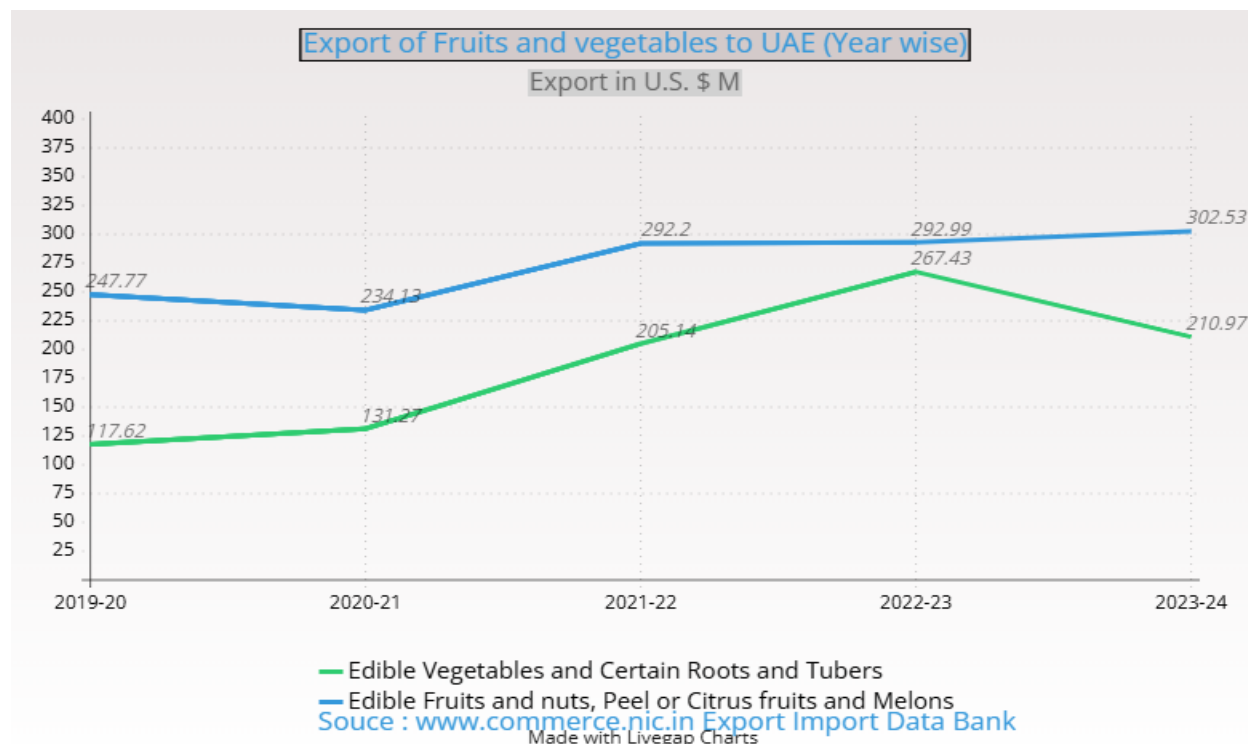


Fig.2. Vegetable Production in India (state wise)

### 6.3 Export to UAE – 5 years trend of Export to UAE

One of the most important components of any functioning economy is exports, which are also a vital component of a nation's economic progress. India has enormous export and processing prospects thanks to the extensive industrial base. India exported ~13,185.31 crores (1635.96 USD million) worth of fresh fruits and vegetables in 2022–2023, of which ~6,219.45 cr (770.71 USD million) were fresh fruits and ~6,965.84 crores (865.25 USD million) [36] were vegetables. The majority of fruits exported from the nation fall into one of the main fruit groups, which include oranges, bananas, mangoes, pomegranates, and grapes. From below graph reproduced using data from export import data bank the trend shows the positive growth rate over last few years.



## 7. Evidence

Mostly driven by fruits and vegetables, The horticultural sector in India has increased astonishingly, achieving an output of 223.088 million tons during the 11th five-year plan. This industry made for a significant 30% of India's agricultural GDP, albeit using a comparatively tiny percentage of the planted area. Nevertheless, there are still issues with completely incorporating waste management methods from Western countries into Indian contexts. Therefore, there is an urgent need for cost-effective, customized technologies that are especially adapted to Indian conditions and concentrate on the manufacturing of value-added products.

In addition to improving value addition, effective post-harvest management turns trash into a useful resource, which eventually lowers production costs and maximizes the use of biomass. A number of cutting-edge process technologies, such as fermentation, drying, freezing, and extraction, show promise as ways to recycle and improve waste in the fruit and vegetable industry. [37] To assist farmers in Bundelkhand, the study aims to make proposals for better after harvest operations and value addition. It draws attention to the economic and nutritious importance of landscaping plants as well as their potential in sustainable agriculture.

## 8. Conclusion :

India's fruit and vegetable exports to the United Arab Emirates offer substantial financial and ecological advantages. With its extensive agricultural resources and varied climate, India is ideally situated to satisfy the UAE's strong demand for fresh goods. The UAE offers Indian exporters a profitable market because of its high reliance on imports because of its little amount of arable land. By generating employment possibilities, raising farmer incomes, and improving foreign exchange revenues, strengthening this trade relationship can benefit India's agriculture industry. But in order

to fully reap the rewards of this trade, important issues including post-harvest losses, wasteful resource use, and environmental sustainability must be resolved. Adopting cutting-edge cold chain infrastructure, raising packaging requirements, and using digital technologies to optimize the supply chain are all crucial strategies. Furthermore, encouraging environmentally friendly farming methods and making sure that energy, fertilizer, and water are used efficiently will improve this export-driven model's long-term sustainability. Reducing waste is still another important factor. When fruits and vegetables are harvested, stored, and transported, large amounts of them are wasted. Modern storage options, more efficient transportation, and stakeholder cooperation can all help to lessen these losses. In order to enhance this trading connection, both countries' public and commercial sectors need to work together to remove regulatory obstacles, encourage quality control, and provide technical and financial support to small-scale farmers. Creating strong connections with markets and making sure that international quality standards are followed will help Indian exporters stay ahead of the competition leading to mutual benefits.

#### CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

#### Acknowledgement :

I express my heartfelt gratitude to my guide, Dr. Murali M. Bhupathi, for his invaluable guidance and support throughout this study. I also extend my thanks to DY Patil Agriculture and Technical University, Talsande, for providing the necessary resources and encouragement for this research.

— Pallavi Nilesh Patil

#### Reference :

- [1] PATIL, Y.G.S., BONIGALA, D. and PRIYANKA, V., 2024. Navigating trade routes: A comprehensive analysis of India's fruit crop trade dynamics. *Journal of Farm Sciences*, 37(02), pp.159-163.
- [2] Farhat, S., 2019. Export competitiveness of India and UAE in Horticulture sector with respect to Balassa Index.
- [3] Kumari, S. and Dhingra, D., 2024. Post-Harvest Management of Fruits in India: A Review. *Journal of Agricultural Engineering*, 61(2), pp.181-201.
- [4] Anu, P.R., 2019. Food and Agricultural Export to GCC Countries: An Effect of Indian Diaspora.
- [5] Puri, A., Teckchandani, J. and Rahman, A., 2022. India-UAE Relations: Emerging Dynamics. *CEMJ*, 30(4), pp.2023-2027.

- [6] Quamar, M.M., 2018. India and the UAE: Progress towards 'Comprehensive Strategic Partnership'.
- [7] Pattnaik, J.K., Ghoble, V.T. and Panda, C.K., 2024. Diaspora as a Catalyst in India-United Arab Emirates (uae) Cooperation. *Diaspora Studies*, 1(aop), pp.1-21.
- [8] Ghanem, S.M., 2001. Industrialization in the UAE. *United Arab emirates: A new perspective*, pp.260-276.
- [9] Laeequddin, M., 2009. Supply chain partners selection criterion in United Arab Emirates: a study of packaged food products supply chain. *Paradigm*, 13(1), pp.20-27.
- [10] Boughanmi, H., Kodithuwakku, S. and Weerahewa, J., 2014. Food and agricultural trade in the GCC: An opportunity for South Asia. Available at Arab New (2015). KH Al-Zahrani et al.
- [11] Fernandez-Stark, K., Bamber, P. and Gereffi, G., 2011. The Fruit and Vegetables Global Value Chain. *Economic Upgrading and Workforce Development*. Durham, NC: Duke CGGC.
- [12] Mittal, S., 2007. Can horticulture be a success story for India? (No. 197). Working paper.
- [13] Alam, I. and Ahmed, S., 2017. Demystifying the puzzle between India-UAE Trade: An analytical study. *The Empirical Economics Letters*, 16, p.12.
- [14] Arce, A. and Marsden, T.K., 1993. The social construction of international food: a new research agenda. *Economic geography*, 69(3), pp.293-311.
- [15] Naikare, S.M., 2021. Utilization and management of food waste. In *Research Anthology on Food Waste Reduction and Alternative Diets for Food and Nutrition Security* (pp. 558-577). IGI Global
- [16] Bairwa, K.C., Sharma, R. and Kumar, T., 2012. Economics of growth and instability: Fruit crops of India. *Rajasthan Journal of Extension Education*, 20(1), pp.128-132.
- [17] Halder, P. and Pati, S., 2011. A need for paradigm shift to improve supply chain management of fruits & vegetables in India. *Asian Journal of Agriculture and Rural Development*, 1(3), pp.1-20.
- [18] Tort, Ö.Ö., Vayvay, Ö. and Çobanoğlu, E., 2022. A systematic review of sustainable fresh fruit and vegetable supply chains. *Sustainability*, 14(3), p.1573.
- [19] Kader, A.A., Zagory, D., Kerbel, E.L. and Wang, C.Y., 1989. Modified atmosphere packaging of fruits and vegetables. *Critical Reviews in Food Science & Nutrition*, 28(1), pp.1-30.
- [20] Bisht, T.S., Sharma, S.K., Rawat, L., Chakraborty, B. and Yadav, V., 2020. A novel approach towards the fruit specific waste minimization and utilization: A review. *Journal of Pharmacognosy and Phytochemistry*, 9(1), pp.712-722.
- [21] Anand, S. and Barua, M.K., 2022. Modeling the key factors leading to post-harvest loss and waste of fruits and vegetables in the agri-fresh produce supply chain. *Computers and electronics in agriculture*, 198, p.106936.

- [22] Ramesh, A., Banwet, D.K. and Shankar, R., 2010. Modeling the barriers of supply chain collaboration. *Journal of Modelling in Management*, 5(2), pp.176-193.
- [23] Singh, S., Sharma, S., Panwar, S., Krishna, H., Singh, S.K., Bahadur, A. and Behera, T.K., 2024. Post-Harvest Management and Value Addition in Vegetable Crops. *Vegetable Science*, 51, pp.34-42.
- [24] Gunadal, N.M., Kerur, N.M., Naik, B.K., Kulkarni, V.S. and Shashidhar, T.R., 2024. Unveiling India's export success: The remarkable performance of gherkins. *Journal of Scientific Research and Reports*, 30(8), pp.90-101
- [25] Kashav, V., Garg, C.P., Kumar, R. and Sharma, A., 2022. Management and analysis of barriers in the maritime supply chains (MSCs) of containerized freight under fuzzy environment. *Research in Transportation Business & Management*, 43, p.100793.
- [26] Keerthika, B., Thilagavathi, M., Rani, C.I., Prahadeeswaran, M. and Vasanthi, R., 2024. An insight into the trend and instability of processed fruits export from India. *Journal of Applied Horticulture*, 26(2).
- [27] Ravi Kumar, K.N., Naidu, G.M. and Shafiwu, A.B., 2024. Exploring the drivers of Indian agricultural exports: a dynamic panel data approach. *Cogent Economics & Finance*, 12(1), p.2344733
- [28] Zeng, D.Z., 2016. Special economic zones: Lessons from the global experience. *PEDL synthesis paper series*, 1(1), pp.1-9.
- [29] Aggarwal, A., 2015. Promoting food processing through food parks and food processing special economic zones: The Indian experience. In *Innovative Institutions, Public Policies and Private Strategies for Agro-Enterprise Development* (pp. 189-219).
- [30] Deshmukh, A. and Song, D.W., 2024. Probing into hinterland connectivity with a web of transport modes and logistics nodes: A case of Indian container ports. *Transportation Research Part A: Policy and Practice*, 189, p.104200.
- [31] Nedumaran, S., Selvaraj, A., Nandi, R., Suchiradipta, B., Jyosthnaa, P. and Bose, D., 2020. Digital integration to enhance market efficiency and inclusion of smallholder farmers: a proposed model for fresh fruit and vegetable supply chain. *International Food and Agribusiness Management Review*, 23(3), pp.319-337.
- [32] PRIYANKA, T., KERUR, N., NAIK, B.K., YELEDHALLI, R. and VENUGOPAL, C., 2024. Export of fruits, vegetables and their products from India-A study on growth rate and instability index. *Journal of Farm Sciences*, 37(01), pp.59-63.
- [33] Parte, J., Tripathi, P., Thingbaijam, L., Patel, M. and Pandey, S., 2023. Export Status of Fruits and Vegetables from India. *Asian J. Agric. Ext. Econ. Soc.*, 41(9), pp.983-988.

[34] Al-Taie, W.A., Rahal, M.K., AL-Sudani, A.S. and AL-Farsi, K.A., 2015. Exploring the consumption of organic foods in the United Arab Emirates. *Sage Open*, 5(2), p.2158244015592001.

[35] Pal, G., Roy, S., Singh, N., Singh, P.M., Chaurasia, S.N.S. and Behera, T.K., 2023. A Study on Export Scenario of Vegetables from India: An Economic Analysis. *International Journal of Social Science*, 12(3/4), pp.103-110.

[36] PATIL, Y.G.S., BONIGALA, D. and PRIYANKA, V., 2024. Navigating trade routes: A comprehensive analysis of India's fruit crop trade dynamics. *Journal of Farm Sciences*, 37(02), pp.159-163.

[37] Vikram, B., Gangwar, S., Belwel, A., Mathur, R., Kumar, P., Kishor, B., Kumari, D. and Sikarwar, P.S., 2023. A review on post-harvest management and value addition of horticultural crops: A source of income generation for the farmers of Bundelkhand, India. *International Journal of Environment and Climate Change*, 13(11), pp.4662-4672