DYNAMICS AND COMPETITIVENESS OF AGRICULTURAL TRADE POLICIES ON COCONUT ECONOMY OF KERALA

By

THASNIMOL F

(2014-21-135)

Department of Agricultural Economics

COLLEGE OF HORTICULTURE

VELLANIKKARA, THRISSUR – 680656

KERALA, INDIA

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Submitted in partial fulfillment of the requirement for the degree of

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DECLARATION

I, hereby declare that this thesis entitled **"DYNAMICS AND COMPETITIVENESS OF AGRICULTURAL TRADE POLICIES ON COCONUT ECONOMY OF KERALA"** is a bonafide record of the research work done by me during the course of research and that the thesis has not been previously formed the basis for the award to me of any degree, diploma, fellowship, or other similar title, of any other university or society.

Vellanikkara — Thasnimol F

30-12-2019 — (2014-21-135)

CERTIFICATE

Certified that this thesis entitled **"DYNAMICS AND COMPETITIVENESS OF AGRICULTURAL TRADE POLICIES ON COCONUT ECONOMY OF KERALA"** is a bona-fide record of research work done independently by **Ms. Thasnimol F (2014-21-135)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, associateship or fellowship to her.

Vellanikkara,
Date: 30 -12-2019

Dr. A. Prema
(Major Advisor, Advisory Committee)
Professor and Head
Department of Agricultural Economics
College of Horticulture, Vellanikkara.

CERTIFICATE

We, the undersigned members of the advisory committee of **Ms. Thasnimol F (2014-21-135)**, a candidate for the degree of **Doctor of Philosophy in Agriculture**, with major field in Agricultural Economics, agree that the thesis entitled **"DYNAMICS AND COMPETITIVENESS OF AGRICULTURAL TRADE POLICIES ON COCONUT ECONOMY OF KERALA"** may be submitted by **Ms. Thasnimol F,** in partial fulfillment of the requirement for the degree.

Dr. A. Prema
(Major Advisor, Advisory Committee)
Professor and Head
Department of Agricultural Economics
College of Horticulture, Vellanikkara
Thrissur-680656

Dr. Anil Kuruvila
(Member, Advisory Committee)
Professor
Department of Agricultural Economics
College of Horticulture, Vellanikkara
Thrissur-680656

Dr. P. Indira Devi
(Member, Advisory Committee)
Professor (Agrl.Economics) and
Director of Research
Kerala Agricultural University.
Thrissur-680656

Dr. Ajitha T. K
(Member, Advisory Committee)
Professor
Department of Agricultural Statistics
College of Horticulture, Vellanikkara
Thrissur-680656

Dr. S. Jayasekhar
(Member, Advisory Committee)
Sr. Scientist (Agricultural Economics)
Central Plantation Crop Research Institute
Kasargode-671124

Dr. R. Senthil Kumar
(External Examiner)
Professor (Agricultural Economics) and
Professor Education (Education cell and Department
of social science
Agriculture College and Research Institute
TNAU, Killikulam, Tuticorin.

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THASNIMOL.F

Affectionately Dedicated
To
My Mother
Shylaja

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Introduction

1. INTRODUCTION

Coconut (*Cocos nucifera* L.) is a crop of economic significance grown in more than 90 countries of the world. Most of the world production is in tropical Asia, with India, Indonesia and Philippines collectively accounting for over 70 per cent of the total production. It is an economically important plantation crop due to its diverse end uses and its scope for providing ample income generation opportunities to farmers. In Sanskrit it is called *Kalpavriksha* which means 'the all giving tree'. Coconut is also designated as 'the tree of life' or 'heavenly tree' or 'tree of abundance' because of its unique properties. Traditionally, coconut has been indispensable in religious, cultural and social functions throughout the country.

India stands first in world coconut production and productivity, contributing 23798.23 million nuts from an area of 2.09 million ha with remarkable productivity of 11,350 nuts per ha (CDB, 2018). India contributes 17 per cent to the global coconut area and 31 per cent to the global coconut production. In India, coconut farming sustains the economic well being of nearly 12 million families (Jnanadevan, 2017c). It adds to the national GDP with an annual contribution to the tune of Rs. 9000 crores and also provides significant foreign exchange earnings of about Rs.1200 crores (Jayasekhar and Thamban, 2016). Coconut is also a fiber yielding crop and provides employment to nearly six lakh workers through coir based industries (Murthy, 2017).

The major coconut products that are exported from India are activated carbon, coconut oil, dry coconut, desiccated coconut, fresh coconut, copra and virgin coconut oil. Though India stood first in the world market, its contribution to the world export was worth only US $ 453 million, which was hardly 10 per cent of total world exports (Sebastian, 2015). India absorbs almost 95 per cent of the total coconut production indigenously and the remaining five per cent is being exported to the global market. Similarly, of the total coconut oil produced in the country, 50 per cent is consumed as edible oil, about 35 per cent used for toiletry and soap sector, eight per cent used for various industrial applications and the remaining seven per cent is exported to the global market (Jnanadevan, 2017a).

Despite the low export volume, the export value of coconut products from India during 2016-17 touched a record high of Rs. 2061 crore, which is 42 per cent more than that of previous year (CDB, 2017).

The trade policies play a key role in determining the overall level and type of agricultural trade in India. The economic reforms of the 1990's and the trade liberalisation policies such as WTO agreement and the Free Trade Agreements (FTAs) have brought challenges and prospects for Indian agriculture. The Indian coconut trade is also not left out of the liberalisation impacts. Mathew *et. al*. (2005) had observed that Indian coconut economy was subjected to a situation of global competition even before the liberalisation era. The coconut oil has to compete with other vegetable oils and fats in the international market due to its high amiability for substitution. The State Trading Corporation (STC) was directly canalizing all the imports prior to 1994, subject to state-imposed import quotas. Placement of palmolein import under a privatized Open General License (OGL) system in 1994 was a break through policy change which eliminated the state monopoly on edible oil import (Babu, 2005). Indian coconut industry encountered major threats and challenges concomitant to trade liberalisation in the form of import substitution with low price products of similar nature (Rethinam and Idroes, 2005). Liberalisation enhanced the abundant availability of cheap vegetable oils like palm oil and soybean oil in the world market.

One of the major states that was severely affected by the trade policies in coconut is Kerala. In Kerala, coconut is an important crop and it is also interlinked with socio-economic life of a large number of small and marginal farmers. As per the latest statistics of 2016-17, Kerala accounts for 37 per cent in area and 31 per cent in production in India with 7448 million nuts from an area of 770 thousand hectares. While, the productivity of coconut is extremely low (9,664 nuts per ha) and is less than the national average of 11,481 nuts per ha (Thamban and Jayasekhar, 2018). Even though Kerala stands first in area and production of coconut among the leading coconut producing states in India, its contribution to total area and production of the country is dwindling over the years.

A large number of coconut products such as coconut, copra, coconut oil, raw kernel, coconut oil cake, toddy, shell, wood-based products and coir based products are manufactured and traded in Kerala. As Kerala and the ASEAN (Association of South East Asian Nations) countries are producing several similar items, competition from the latter is a cause of concern. The domestic price of coconut oil in Kerala has been ruling higher compared to international prices. Due to the advantage of high demand coupled with a relatively high price in the domestic market, the coconut industry did not give much attention to the export during the pre-liberalisation era. At this juncture, the trade liberalisation policies facilitated the import of cheap substitutable oils, especially palm oil, palm kernel oil and soybean oil. The price difference between coconut oil and palm oil encouraged the low and middle income households to change preferences for their cooking oil and substituted the coconut oil with comparatively cheaper palm oil (Vijayan and Job, 2013).

The coconut market in Kerala has been always unstable and uncertain due to frequent fluctuations in prices. The fierce competition from other edible oils consequent to liberalization was observed to be one of the reason of price fluctuation (Jayasekhar, *et al*., 2013). However, the stable markets and remunerative price are the major driving forces that determine the persistence in production and productivity of the farms, especially in traditional growing states. A fall in the price always leads to less investment and less attention to the management aspects which it in turn reduces the productivity of the crop (Mathew and Baby, 2011). It has been indubitably proved that the increase in production and productivity alone cannot improve the profitability of coconut farming in Kerala. Better realization of price is also an important aspect for the farmers to remain in coconut production. Despite the above facts, marketing of coconut is more cumbersome due to scattered holdings, unorganized nature of coconut farmers and large number of intermediaries (Chinniah and Suresh, 2013; Jayasekhar *et al*., 2016). As efficient marketing system fosters the income level of the farmers through providing better price, it is necessary to study the economics of marketing to make suitable micro level policies relevant to the study area.

Even though trade liberalization policies generate high fluctuations in world prices of agricultural commodities, it has the potential for augmenting the size of the domestic markets through integration. The international markets are connected to each other not only to meet the domestic requirements through import, but also to export the surplus products to other countries and thereby generate foreign earnings (Jena, 2016). Integration of the market is considered as the pre-condition for effective marketing reformation. The high degree of market integration indicates the better competitiveness of the market, and facilitates the farmers to specialize according to comparative advantage (Mukhtar and Javed, 2008).

During the past two decades, the coconut crop had received ample research and development attention in the country. Research studies in the sector had resulted in development of an array of value added coconut products and increased the demand for such coconut products worldwide. Along with this, the efforts made by the Coconut Development Board (CDB) have given a fillip to coconut processing and value addition. Even though many value-added products have been introduced in the domestic market through various programmes of CDB, India could not able to reap the advantage of liberalisation and place the value-added products in the global market. To harness India's trade advantage, it is imperative to think beyond the periphery of production and productivity and integrated efforts should be taken to develop more of value added products. Of late, the export earnings are picking up with the surge in growth of industries, mainly based on activated carbon, shell charcoal and virgin coconut oil. In view of the changing scenario in the coconut sector, it is felt necessary to study the future prospects of Indian coconut sector in the liberalised trade regime.

With the above backdrop, the present study aims to trace out the agricultural trade policies with respect to the edible oil and assess the effect of these policies on the coconut economy of the country and the state, Kerala. The study analyses the competitiveness and comparative advantage of coconut production in Kerala. Moreover, the study also examines the efficiency of

domestic coconut markets as well as integration and price transmission between domestic coconut oil market and other international edible oil markets. The study also attempts to look into the impending crisis experienced in the coconut sector and provides suitable suggestions to improve the performance of coconut trade from Kerala.

The specific objectives of the study are

1) To trace and assess the impact of trade policies in edible oil on coconut economy of Kerala
2) To estimate the efficiency of selected coconut markets
3) To analyse the price transmission in the markets
4) To suggest appropriate policy measures for improving performance of coconut trade

1.1 LIMITATIONS OF THE STUDY

The study is based on the responses of farmers from Thiruvananthapuram, Thrissur and Kozhikode districts of Kerala state and hence generalizations need not be quite accurate. The present study mainly uses the primary data collected from farmers and market intermediaries through pre-tested interview schedule, and therefore extent of recall bias may occur. However, the data was cross-checked to minimize the errors and misapprehensions. Though the liberalistaion and subsequent trade agreements are favouring the large export of coconut derived products, the lack of sufficient and long time period export data on value added products and by-products limits the researcher to concentrate only on traditional coconut products. The unavailability of state-wise trade data also limited the analysis of export performance of coconut from Kerala. Besides, common limitations of statistical analysis might also have affected the study slightly. In spite of these, maximum care has been taken to ensure that such limitations do not affect the authenticity of findings of the study.

1.2 PLAN OF THESIS

The thesis is mainly organized and presented in five chapters. The first chapter provides a general introduction to the thesis. The second chapter intends to provide the theoretical and empirical background of the study by reviewing previous studies related to the present research. The third chapter provides an overview of the study area, nature and sources of data, analytical tools employed for evaluating the objectives and interpreting the results. The results and critical discussion of the results are provided in chapter four. A brief summary of the overall results and the main findings of the study along with the policy implications that emerged, are presented in chapter five.

Review of Literature

2. REVIEW OF LITERATURE

A review of past studies helps in identifying the conceptual and methodological issues relevant to the study. It will enable the researcher to gather relevant information, analyse and interpret the same to draw meaningful conclusion. This chapter attempts to provide a brief review of the relevant studies related to the present topic. Keeping in view the objectives of the study, reviews are presented under the following headings.

2.1 Dynamics of coconut production

2.2 Trade policies and its impact on agricultural sector

2.3 Competitiveness and export performance of agricultural sector

2.4 Impact assessment using Policy Analysis Matrix (PAM)

2.5 Marketing of agricultural produce

2.6 Market integration and price transmission

2.7 Suggestions and policy measures to improve the competitiveness of coconut sector

2.1 DYNAMICS OF COCONUT PRODUCTION IN INDIA

Babu (2011) observed that the Philippines, Indonesia, India, and Sri Lanka had seized the lion share of coconut production in the world during the1980s. The Philippines, which maintained the foremost position with a 28.35 per cent contribution to the world coconut production in 1980 shifted to the second position with a comparative share of 25.39 per cent in 1997. On the other hand, Indonesia, which occupied the second position in 1980, emerged as the leading producer of coconut in 1997. Even though India remained in the third position, the relative contribution has increased from 13.96 per cent in 1980 to 16.45 per cent in 1997.

Gopalakrishnan (2013) observed that coconut was the main subsistence crop of more than 42 lakh families in the state. The coconut sector contributed to around 15 per cent share in state annual income and 35 per cent share to the state agricultural income. In Kerala, Kozhikode district continued at the top position in terms of area (1.19 lakh hectares). In the case of production, Kozhikode district occupied the second position next to Malappuram. Even though Kozhikode has the largest area under coconut cultivation, compared to other districts the productivity was found to be very low (7284 nuts per hectare).

Karunakaran and Gangadharan (2014) compared the predominant cropping pattern in Kerala during the periods 1960-61 and 2009-10. The study confirmed that the cropping pattern in the state was significantly changed from food crops to non-food crops, particularly to coconut and rubber. During 1960-61, the share of rice was found to be high in the total cropped area of Kerala followed by coconut, tapioca, rubber, and pepper. However, a substantial change in the cropping pattern occurred after 2009, whereby coconut came into the first position followed by rubber, rice, pepper, and arecanut.

Thamban *et al.* (2016) studied the trends, challenges and opportunities of coconut production in Kerala. They emphasized the adverse effect of trade policies on edible oil on the coconut prices of Kerala. Compared to other Indian states, Kerala majorly depended on coconut oil for culinary purposes and its elasticity of substitution to other cheaper oils was very high in the hotel, confectionery industries and among low-income households. Free trade policies facilitated the import of palm oil at reduced tariff rate and its distribution through Public Distribution System (PDS) at subsidized prices, which indirectly reduced the competitiveness of coconut oil in the state.

The coconut production in India for the year 2015-16 was observed to be 4.92 per cent less than that of the previous year. Among the four major coconut growing states in India, only Kerala registered an increase of 8.37 per cent in production compared to the preceding year. The production recorded a significant decrease in the Karnataka and Andhra Pradesh, while in Tamil Nadu production

showed a nominal fall of only 1.06 per cent. In Kerala, the production increased in eight districts, the major raise occurred in Palakkad, Kannur, Kozhikode, and Ernakulam. Largest coconut producing district was Kozhikode with a production of 1,098 million nuts, followed by Malappuram with 890 million nuts. The deficient rainfall coupled with pest and disease attack was reported to be the major reason for the decrease in the production of coconut in the country (Vasanthakumar, 2016).

Yamuna and Ramya (2016) brought out the profitability and economic aspects involved in the cultivation of coconut in Pollachi Taluk in Tamil Nadu. The study highlighted that even though Pollachi played a very critical role in the production of coconut, it slowly lost its status because of unremunerative prices. The researchers urged the policy-makers and other stakeholders to take the necessary steps to boost up coconut cultivation. As the farmer's share in consumer's rupee was very low, the marketing system was unfavorable to the farmers. They also opined that only through government interventions to regulate the coconut marketing process, by providing financial assistance to make value-added products from core products, the coconut industry in Pollachi could be saved.

2.2 TRADE POLICIES AND ITS IMPACT ON AGRICULTURAL SECTOR

Samarajeewa *et al.* (2002) reported that the trade liberalisation in edible oil reduced the demand for coconut oil, and this, in turn, lessened the price of coconut oil. Consequently, a demand shift occurred in the fresh coconut market. The producer surplus analysis implied that there was a welfare loss for fresh coconut producers due to the trade liberalization policy in the edible oil market. Moreover, the trade liberalization in the edible oil had notable implications on the productive sectors of fresh coconut, coconut oil, and desiccated coconut.

Dohlman *et al.* (2003) observed that the vegetable oil consumed in India in the early 1970s were peanut oil (53%), rapeseed oil (25%), and cotton seed oil (9%). Palm oil, soybean oil, and sunflower oil collectively accounted for less than four per cent of the total consumption of vegetable oil. The situation changed

considerably during the 1990's and the palm oil and soybean oil became the leading edible oil in the consumption basket accounting for 38 per cent and 21 per cent of total consumption, respectively. The substantial increase of palm and soybean oil imports and their expanding share in the consumption had reflected the sensitivity of Indian consumers to price changes. They also pointed out that trade policy reforms in the mid-1990s has augmented the market access and domestic price support policies.

According to Ghosh and Jayati (2005), the progressive reduction of trade restrictions of various types affected Indian agriculture in the 1990's. Quantitative restrictions on imports rendered tariffs irrelevant in the early 1990's, and thereby tariff rates for most of the agricultural commodities were low or zero during that period. Moreover, the quantitative restrictions on imports and export restrictions on some agricultural products were removed from 2000 onwards and as per the new trade policy all agricultural products were permitted to be freely exported.

Srinivasan (2005) found that consumers were the prime beneficiaries of trade liberalisation in the edible oil sector. The substantial gain to the consumers can be compensated for the marginal losses incurred by other agencies with an overall net gain. Through liberalization, prices of both oils and oilseeds were reduced. The consumption of the palm oil and soybean oil was increased, while the consumption of other edible oils decreased because of the substitution effects. Through simulation model, they also brought out some alternative mechanisms to support prices received by oilseed farmers. The result of the simulation model unveiled that import tariff on oilseeds was an inefficient method in supporting farmers prices while–government subsidy turned out to be the best method to support oilseed farmers.

While analysing the impact assessment of trade liberalization Pahariya (2006) noted that edible oil trade had been completely deregulated within a short time. The post-liberalization period favoured the import of edible oil with a relatively low incidence of customs duties. In India, the import of edible oil increased from 0.10 million tonnes in 1992-93 to 4.3 million tonnes in 2002-03. In the total agricultural imports, the share of the

expense of edible oil increased from six per cent in 1991-92 to 52 per cent in 2002-03. Since 1990-91, almost four years the country devoted 50 per cent of the total expenses on agricultural imports for the import of edible oils.

Suresh and Lander (2006) evaluated the impact of changes in the tariff rates using simulation models. A 10 per cent increase in the tariff rate, increased the average wholesale price of oil and farm price of oilseeds by 4.5 and 2.9 per cent respectively. A reduction of 10 per cent tariff level resulted in the reduction of oilseed price by 4.5 per cent, while consumption and import increased by 2.5 per cent and 6.7 per cent respectively.

Rupasena *et al.* (2007) highlighted that as a result of a concessionary rate of duty granted in 1998, the coconut oil industry of Sri Lanka was severely affected. Except for coconut oil, the duties on all other edible oil were reduced from 35 per cent to five per cent. This resulted in the import of large quantum of cheap edible oil against which coconut oil could not compete. Consequently, a large number of coconut oil mills had to be closed down. The reduced capacity in the coconut oil milling industry could not absorb the excess nut production, which led to the downward pressure on nut prices during 2000. This situation triggered the government to revise its tariff policy on edible oils, and the duty was fixed at 25 per cent in April 2000. In addition, the government has imposed a 25 per cent surcharge to arrest the fall in nut prices.

Ghosh (2009) examined the nature and implications of trade liberalization with respect to the Indian context and reported that during the 1990s the total merchandise import exceeded the export and trade balance was deteriorated quite drastically especially after 1997. Though trade liberalization policies brought prosperity to those people with secure jobs and incomes, it adversely affected the poor people. They lost their income and were not able to purchase the necessary goods even at lower prices.

Francis (2011) claimed that the tariff reduction and its elimination under the ASEAN India Free Trade Agreement (AIFTA) enhanced the availability of agricultural and processed products in Indian markets. This expanded supply

lessened the bargaining ability of farmers and this caused a decline in the domestic prices of agricultural and associated products. Though various safeguard provisions under the FTAs were employed by the Indian government, tariffs could not be raised above the levels scheduled in the agreement. Hence, India could raise the tariffs with ASEAN only to the highest level that was already committed in the agreement and with tariffs dropping to zero in several cases, this had become irrelevant. In this manner, India's commitments under the AIFTA seemed to cause a considerable negative impact on livelihoods and food security across various sections of the rural population. Even though India's exclusion list contained a number of agricultural products for livelihood concern, a product on the exclusion list may not be protected forever; as it will be subjected to the review of AIFTA committee. Native producers may confront increased competition from cheaper imports that substitute the domestically grown agricultural products and other products included within the exclusion list.

Mathew and Baby (2011) noted that the increased domestic production cost coupled with the tremendous import of low-priced substitutable oils such as palm oil and soybean oil adversely affected the prospects of coconut farmers. As the domestic production of edible oil could meet only three per cent of the effective demand, India depended on edible oil imports to the extent of 70 per cent to satisfy the domestic requirements. The annual import of vegetable oil increased from 11.6 lakh tonnes in 1995-96 to 81.8 lakh tonnes in 2008-09. Even though liberalisation renders ample opportunity to the coconut farmers, the farmers are not able to reap the benefit due to high global competition.

Veeramani *et al.* (2011) assessed the impact of ASEAN-India preferential trade agreement on plantation commodities by employing the Smart and Gravity model. They found that the trade agreements caused a significant increase in India's import of plantation commodities from ASEAN countries. Though the proposed tariff reduction may have led to some loss of tariff revenue to the government, the gain in consumer surplus surpasses the loss resulted in the net welfare gain. However, this rush in import caused some shrinkage in the

production of plantation crops in the domestic market and the necessary restructuring would have caused displacement and adjustment difficulties for planters, farmers and plantation workers in India.

Jafri (2012) affirmed that the trade liberalization and subsequent FTAs adversely affected the edible oil industry in India. The frequent reduction of the import tariff on crude and refined palm oil severely affected the price stability of coconut and its products. The zero import duty on crude oil and nominal duty on refined palmolein during 2008 have favoured the import of cheap substitute oils at the expense of Indian oilseed farmers. Consequently, a massive inflow in the import of edible oils from 5.61 million tonnes in 2007-08 to 8.82 million tonnes in 2009-10 was observed. Moreover, the negative propaganda against coconut oil in the late 1990s by projecting its health hazard favoured the market for imported oil, especially palm oil and soybean oil.

Thomas *et al.* (2013) asserted that the availability of edible oils in the country is associated with various factors such as performance of edible oil seeds, trade policies, domestic edible oil availability and import scenario. The trade liberalisation reduced the protection available to oil seed cultivators by exposing the domestic economy to edible oil imports from overseas. Consequently, it resulted in the integration of domestic edible oil prices with global market price and its impact was experienced through the increased instability in domestic prices as well as the reduction of growth rate of edible oil prices in the domestic markets.

Sharma (2014) observed that though India has a reasonably high bound rate of tariff on major edible oils, the applied rates have never outstripped 92.5 per cent during the post-reform period. The tariff rates were repeatedly revised between August 2001 and July 2006, and it created an ambiguous situation for farmers in distributing their land for oil seed cultivation. The trade policy had a major impact on the oilseed economy of the country as half of the domestic requirement is met through imports. Price fluctuations in international markets and import tariff structures have played a key role in determining the domestic

price directions. The import of oilseeds at low duty may have a negative impact on oilseed producers. Therefore, to safeguard the interest of oilseed farmers, the landed price of oilseeds should be higher than the domestic prices.

Meena *et al.* (2015) scrutinized the changing scenarios of oilseeds and edible oil sectors in India. During the pre-liberalisation period, all the oilseeds recorded positive growth in the area, production and yield. Sunflower recorded the most notable growth in area and production followed by soybean. Conversely, in the post-liberalisation period, area under all the oilseeds except soybean showed a negative growth rate and implying a clear negative impact of trade liberalisation. The influx of low-priced imported oil reduced the demand for oilseeds, and edible oils like, groundnut, rapeseed, mustard, etc. and led to the fluctuation in the farm gate price of oilseeds. Since 2000-01, a drastic change in the consumption pattern of edible oils occurred and the share of the groundnut, rapeseed, mustard and soybean oils to the total edible oil consumption has decreased. Palm oil occupied a major share in the consumption basket followed by soybean oil and mustard oil.

Singh (2016) found that coconut prices showed an upward trend from the middle of 2013-14 and retained an extremely promising trend throughout 2014-15. However, the scenario got reversed in 2015-16. They analysed the price behaviour of coconut oil in India over the years and observed that the domestic price of coconut products were always ruling higher compared to international prices. But, the gap between international and domestic price narrowed down and in March 2016, the international price became distinctly higher than that of domestic price. This gave a boost to the Indian coconut oil exporters.

Thamban *et al.* (2016) reported the detrimental impact of ASEAN-India Free Trade Agreement (AIFTA) on the coconut economy of India. In AIFTA agreement coconut and coconut oil were placed in the exclusion list, but there is a general commitment under AIFTA to review the exclusion list every year with a view to improve the market access. Therefore, they argued that, if coconut is removed from the exclusion list because of the existing price difference it may

result in cheaper import of coconut and its product, which may adversely affect the farming community.

Ali (2017) analysed the impacts of national rice development policy strategies in Malaysia and reported that as a result of free trade, more import of rice occurred in the domestic economy and this lead to an increase in competition among domestic rice farmers. The free trade policies adversely affected the rice farmers by reducing their income and augmenting the poverty rates of both poor and extremely poor. However, the fall in the consumer prices for long grain rice led to the increased consumption of rice.

2.3 COMPETITIVENESS AND EXPORT PERFORMANCE OF AGRICULTURAL SECTOR

Kumar *et al.* (2008) used the Revealed Symmetric Comparative Advantage (RSCA) to assess the competitiveness of gherkin export from India. The country made immense growth in the export of cucumber and gherkin products during 1990-2005. The export augmented with an impressive growth rate of 37.46 per cent. The major export markets for gherkin and cucumber were France, USA, Russia, Belgium, and Spain. An increasing value of Revealed Comparative Advantage (RCA) and a positive and increasing value for Revealed Symmetric Comparative Advantage (RSCA) implied a high potential in their export. A one per cent raise in the volume of international trade increased the demand for cucumber and gherkin from India by 5.96 per cent. The result indicated that India was highly competitive in the export of cucumber and gherkin and has plenty of opportunities to expand its export share.

Ramanathan *et al.* (2009) examined the direction of trade in cashew for the pre-liberalisation and post-liberalisation period with the help of a Markov chain model. The results showed that the USA and the Netherlands were the major importers of Indian cashew as indicated by the high share of retention, in both pre and post liberalisation periods. The other countries like the UK, Japan and Australia with low values of probability of retention of shares in the pre-liberalisation period indicated that they are unstable importers of Indian cashew.

The Ivory Coast, Tanzania, and Guinea-Bissau were the major stable exporters of raw cashew nuts to India as reflected by the high probability of retention. On contrary, Mozambique, Benin, and Indonesia had a probability of retention of zero in the post-liberalisation period, indicating that they are the most unstable exporters of raw cashew.

Babu (2011) worked out the Nominal Protection Coefficient (NPC) of coconut export from India using the data from 2003 to 2009 for Thrissur and Pollachi market. The NPC values estimated were 1.68 for the Thrissur and 1.21 for the Pollachi. The value of NPC greater than one indicated the lack of global competitiveness. The instability in output prices, high wage rates, shortage of labour, high incidence of diseases, and increasing cost of production were identified as the major constraints which critically affected the coconut production.

Anoopkumar (2012) analysed the dynamics of domestic price instability of five major plantation crops: coffee, tea, natural rubber, black pepper and small cardamom. The instability in the prices of plantation crops like black pepper, coffee and natural rubber increased during the post-reform period as compared to the pre-reform period. For these crops, the domestic market was highly integrated with the global market and hence showing greater instability in the open trade regime as compared to the protected regime. Conversely, the crops like small cardamom and tea for which the market was highly domestic-oriented were showed a drop in instability in the open trade regime as compared to the protected regime. Hence, it was concluded that increased global integration of commodity markets for natural rubber, coffee and black pepper resulted in an increase in price instability. On the other hand, the domestic market orientation of small cardamom and tea served to reduce their price instability in the open trade regime.

Sebastian (2012) opined that until 2006-07 India's export of coconut product was below Rs.10 crores, and later on, it enhanced gradually and reached Rs. 200 crores in the 2011-12 period. Up to 2006-07, Sri Lanka was one of the

foremost exporters of coconut within the Gulf markets. Later, the decline in production of coconut in the country due to the unfavorable climatic factors adversely affected the export competitiveness of that nation. Further, the restrictions and ban imposed by Sri Lanka on coconut exports with a view to secure its domestic coconut based industries created a fabulous opportunity for the Indian coconut exporters to grab the market of Bangladesh and other Gulf countries.

Tejaswini and Murthy (2012) studied the export performance of desiccated coconut from India during 1991-92 to 2007-08 using growth rates and instability indices. Though the export growth rate of desiccated coconut from India showed a positive trend, India was an unstable exporter of coconut as indicated by the high instability index. Markov chain analysis carried out to detect the direction of trade, indicated that, among the countries to which India exported desiccated coconut, UAE was the largest destination, followed by Nepal, USA, Kuwait, Saudi Arabia, and Bahrain.

Majumdar (2013) analysed the export performance of processed food in India using a best fitted exponential growth model. The comparative advantage of India's processed food export was computed using Revealed Symmetric Comparative Advantage (RSCA). Of the eight processed foods studied, India had a comparative advantage for four food items, namely guar gum, groundnut, dried fruits and vegetables in the world market. Except for a few processed products, the growth rates of other products were found to be quite high. However, the contribution of this sector to the world trade is almost insignificant.

Rajur and Patil (2013) assessed the growth pattern, trade competitiveness, and direction of chilli export from India. Nominal Protection Coefficient (NPC) was computed to determine the extent of the comparative advantage enjoyed by the commodity. The value of NPC was less than one throughout the period and indicated the competitiveness of chilli crop. The authors have suggested that to capture a great share in the world market, much emphasis must be given on sanitary measures and standardization procedures.

Adegbite *et al.* (2014) evaluated the competitiveness of pineapple production in Osun State, Nigeria. The impact of government policies on pineapple production was measured using output transfer, input transfer and net transfer. The results showed that pineapple production using both crown technique and sucker technique had negative output divergence of Rs. 81,992 and Rs. 1,31,088 respectively. The result implied that the government's prevailing policies on output reduced the profitability of pineapple producers. The input divergences in pineapple production using both the techniques were found to be Rs. 1,078, which inferred that inputs used in pineapple production were net taxed.

Boansi (2014) compared the export performance of seven agricultural commodities during the various phases of agricultural diversification project in Ghana. The export performance was assessed using the Comparative Export Performance (CEP) index and the Symmetric Comparative Export Performance (SCEP) index. The commodities were placed under the categories of highly competitive, competitive, weakly competitive, and uncompetitive based on the newly developed threshold. Besides, cocoa and pineapples which were 'highly competitive' in export performance even before the initiation of the project, only rubber exports witnessed major improvement during the project phase.

Gupta (2014) examined the export competitiveness of different agricultural commodities from India and found that India has a competitive advantage in the export of several agricultural commodities due to cheap labor, self-sufficiency in inputs and diverse climatic conditions. In the post WTO period, the trade has become highly competitive and the comparative advantage may be lost due to the lack of sufficient infrastructure as compared to the competing countries.

Deepika (2015) examined the shifting patterns of international trade in plantation commodities and analysed the factors contributing to competitiveness. Four major plantation crops (coffee, tea, cashew, and pepper) were chosen for analysis. For cashew, India achieved good unit export prices against the competitors in almost all the markets. Hence the policy makers paid higher attention for cashew processing in India through the promotion of processing

industries. The study highlighted that, even though tariff barriers were very limited in the case of plantation commodities, non-tariff barriers continued to retard the competitiveness of plantation commodities in India.

Idris *et al*. (2015) examined the composition and direction of India's horticultural trade and analysed the comparative advantage that India enjoyed in selected markets with respect to its competitors. In the case of fresh grapes, guava, and mango, India had a comparative advantage over China in the Asian market. Conversely, in the case of cashew, Tanzania and Vietnam consistently enjoyed a comparative advantage over India in the EU market. They also examined the impact of various sanitary and phytosanitary provisions stipulated by importers of horticultural products on India's trade. Food safety standards stipulated by the USA and EU had considerable impact on Indian horticultural exports as the country faces the highest number of rejection of consignments. The non-tariff barriers established by the importing countries combined with other factors like zero tolerance to insects and pests, and issues in certification, also caused difficulties to the exporters.

Jagdambe (2016) found that India's export intensity in total agricultural trade was increasing with respect to the Association of South East Asian Nations (ASEAN). However, the import intensity was found to be declining over the study period. Even though the pattern of India's comparative advantage in the export of agricultural products with ASEAN varied from one commodity to another, the comparative advantage was decreasing gradually throughout the study period. The study recommended the requirement of appropriate policy initiative to promote the products that have a comparative advantage in exports. It will additionally help the producers and exporters to pick out appropriate commodities that have a best comparative advantage for trading.

Sabu and Kuruvila (2016) analysed the instability of black pepper prices in Indian and international markets in pre and post liberalisation periods. The extent of price instability has increased significantly in the Indian market during the post-liberalization period, while it has declined in the international markets. Thus,

the liberalisation policies of the government led to the transmission of price volatility from international markets to the domestic market.

2.4 IMPACT ASSESSMENT USING POLICY ANALYSIS MATRIX (PAM)

Mohanty *et al.* (2003) assessed the competitiveness of Indian cotton production using PAM. The efficiency of cotton production was examined in the five major producing states in India using a modified PAM. The PAM indicators suggested that cotton was not efficiently produced in the second largest cotton producing state in the country, Maharashtra. Sugarcane and groundnut had enjoyed a significant comparative advantage in that state over cotton. Therefore, they opined that without much effort from the government, it was likely to shift the acreage in this state away from cotton to more profitable crops, such as sugar cane and groundnut.

Finkelshtain *et al.* (2011) has used PAM approach to assess the government support for the Israeli agriculture and its impact on comparative advantage, agricultural trade and social profits. They examined the impact of varying social prices, availability of domestic factors and analysed the consequences of partial or complete removal of government supports for agricultural producers in Israel. The profits from vegetable crops were found to vary greatly and in some cases it became negative except fruit crops. The negative profit of the vegetable crop might be attributed to the high opportunity wages for farm operators assumed by the extension service. In addition, they observed higher private profits for the crops that have a relatively higher share of export. High support for some agricultural crops suggests that there exists an important potential for specialization and regional trade, once barriers to trade are removed.

Ogbe *et al.* (2011) constructed the PAM framework to study the competitiveness of Nigerian rice and maize production. A positive private profit for upland rice, irrigated rice, and upland maize implied that these ecologies were competitive at current technologies, prices of inputs and outputs. On the contrary, the low land rice and irrigated maize ecologies were found to be unprofitable and

lacked competitiveness. The Nominal Protection Coefficient (NPC) was less than unity indicating that the farm gate price was less than the international price for rice. Nominal Protection Coefficient of Input (NPCI) of less than unity which implied that the input cost in all production system or ecologies were lower than the world reference price. The result from the study suggested the need for the removal of policy distortions to increase the incentives for producers in order to expand the output.

Kanaka and Chinnadurai (2013) used the PAM to work out the profitability of rice farming. PAM was computed for a sample of rice growers typically located in the wetland of the Tamil Nadu under conventional and profit efficient farming conditions. The private profit of Rs. 3,811.42 indicated precisely the competitiveness of the agricultural system. Social profit of Rs. 2,046.34 indicated that the state had used its scarce resources efficiently and had a static comparative advantage in the production of rice.

Khai and Yabe (2013) used the PAM to estimate the comparative advantage of soybean production in Vietnam. The estimated value of Nominal Protection Coefficient on Output (NPCO) was found to be less than one. This depicted that soybean farmers were receiving a slightly lower price than they would have received when facing world prices. The value of Nominal Protection Coefficient of Input (NPCI) was 1.06. This indicated that soybean farmers were taxed when they buy tradable inputs. The estimated Domestic Resource Coefficient (DRC) was less than one, and indicated the comparative advantage in the country's production.

Souza and Revillion (2013) evaluated the profitability and the effects of direct and indirect taxes on rice production in Brazil compared to other member countries of Mercosur (Argentina, Paraguay and Uruguay) using PAM approach. The results have shown that in 2010, rice production in Argentina and Uruguay had positive social and private profitability, while in Brazil and Paraguay there were negative private results. A simulation study was also carried out in Brazil by considering a reduction in the direct and indirect tax burden to a similar

percentage between the countries compared. Under the simulation of this new scenario, the production of rice in Brazil did not remain in deficit, but it had a very low profitability. The study clearly depicted that the other variables such as product development, technologies and exchange rates, also significantly affect the profitability of rice production in Brazil.

Fatah *et al*. (2015) examined the competitiveness and comparative advantage in rice production under different scenarios of existing policies and economic reforms in Malaysia using PAM. The empirical results showed that the rice farming is marginally competitive and generates relatively low social profits. Out of four states, three have comparative advantages in producing rice with Domestic Resource Cost (DRC) values less than one. Conversely, the results depicted that there was no comparative advantage for rice production in the KETARA granary area, as DRC is greater than one.

Makama *et al.* (2016) assessed the export competitiveness of Indian rice using PAM for the years 2010, 2011, 2012, and 2013. The computed social revenues were much higher than the private revenues, which implied that rice grown in India was net taxed. The values of NPC, EPC, and DRC were found to be less than unity which inferred that the domestic price of rice in the country was lower than the world price and hence competitive worldwide. The value of average DRC was found to be 0.37 which is indicative of efficient utilization of domestic resources and comparative advantage in the production of the rice crop.

Oluyole *et al.* (2017) analysed the competitiveness and comparative advantage of cashew production management systems in Nigeria using PAM framework. The result of Private Profitability was positive in all the three production systems while the Private Cost Ratio (PCR) was less than one in all the production systems considered. The computed value of Social Profitability (SP) and Domestic Resource Cost (DRC) was found to be positive and less than unity in the three cropping systems. The result depicted that the cashew production in Nigeria is having comparative advantage and hence, cashew farmers in the study area utilised their resources efficiently to produce cashew.

Priyanka *et al.* (2017) used PAM to find out the profitability and efficiency of integrated sugar production in Tamil Nadu state of India. PAM helped to incorporate all policy interventions and environmental externalities (cost and benefit), so that the analysis results would render policy interventions to support the economic and environmentally efficient combination of integration. A comparison of results from PAM for various possible combinations showed the integration of sugar mill with distillery (ethanol) and co-generation plant as efficient to provide the industry with a positive net income with least negative externalities on the environment.

2.5 MARKETING OF AGRICULTURAL PRODUCTS

Narayanan and Bastine (2004) conducted a study in central Kerala to analyse the price spread of coconut. The field level survey was carried out in Ernakulum, Palakkad and Thrissur districts and it was observed that 86 per cent of the farmers sold the nuts in the farm itself. Farmers found it convenient and easy to sell the nuts in the farm itself rather than selling it in the local markets. For 100 nuts, the price received by the farmer was Rs. 310 while the price paid by the ultimate consumer was Rs.512 and thus the price spread was found to be Rs. 202. This indicated that the producer's share in consumer's rupee was 61 per cent and the price spread accounted for a sizeable 39 per cent.

Rangasamy and Dhaka (2008) compared the marketing efficiencies of dairy products in co-operative and private dairy plants in Tamil Nadu. The study used the data for toned milk, standardized milk, full cream milk, flavoured milk, butter and ghee from selected co-operative and private dairy plants. Even though the marketing cost of toned milk was the same in both the dairy plants, it was higher for standardized milk, full cream milk and flavoured milk in the co-operative dairy plants. Except for toned milk, all the dairy products earned more marketing margin in the private than co-operative dairy plants. Similarly, the marketing efficiency of the co-operative plant for all dairy products was seen to be relatively less than that of private dairy plants.

Baba *et al.* (2010) reported the price spread of vegetables in Kashmir Valley. The factors like production, area under improved varieties, net price received by producers and education levels were significantly affected the marketed surplus of the vegetables. The computed price spread in various marketing channels indicated that the producer's share had an inverse relationship with the number of intermediaries. The net price received by the producers was relatively higher in the channels in which the produce was directly sold to the consumers or retailers.

Kumar and Kapoor (2010) examined the market chains for coconut in the five coastal districts of Orissa. To reflect the value addition through various participants of the chain, they computed the marketing margin at different stages. The farmers were able to make a profit through all marketing channels. They were able to sell the entire production with a reasonable profit and got more than rupees four per unit as margin. The farmers did not incur much loss in spite of the lower price, due to comparatively low maintenance cost. Further, they also pointed that the entire demand of marketing channels in the state was not being met by internal production. More than 50 per cent of the aggregators were seen keeping a track on the coconut markets in the neighbouring states.

Singh *et al.* (2010) identified the four important marketing channels of mushrooms in Haryana, viz. I: mushroom grower - wholesaler/commission agents - retailer - consumer; II: mushroom grower - wholesaler/commission agent - consumer; III: mushroom grower-retailer - consumer; IV: mushroom grower - consumer. Of the various channels, channel I emerged as the common channel amongst various categories of mushroom growers. However, the producer's share in consumer rupee was the lowest in channel I.

Sidhu *et al.* (2011) pointed out that marketing margins and marketing costs were the crucial factors that typically affected the marketing efficiency of green peas in Punjab. A one per cent increase in the marketing margin and marketing costs deteriorated the marketing efficiency by 0.45 and 0.44 per cent respectively.

The impact of cost in reducing marketing efficiency has been found to be smaller than that of marketing margin. The marketing efficiency and producer's share in consumer's rupee was reported as higher in case of direct sale by the producer to the consumer.

Chinniah and Suresh (2013) dealt with the marketing aspects of coconut in Coimbatore districts. Though the district played a vital role in coconut production, it slowly lost its position due to unremunerative price. As the average age of the coconut palm was found to be on a declining stage, its productivity was coming down from the year 2008-09 onwards. In addition, the farmer's share in consumer rupee was only 41 per cent, thus marketing system was unfavourable to the farmers.

Aswathy *et al.* (2014) employed Shepherd's approach to study the marketing efficiency of different local channels and interstate marketing channels of fish markets in Kerala. The fishermen's share in consumer rupee and marketing efficiency index were found to be highest for seerfishes followed by pomfrets and mackerals. The intense demands of seer fish in the domes ic, as well as export market led to a marked increase in the prices in recent years. In the case of mackerals, the immense demand from the export sector had created scarcity in the domestic market and led to the price escalation. The price hike of fish in the domestic markets promoted the increased transport of fish from other coastal states which involved more intermediaries.

Dhara *et al.* (2015) analysed the characteristic and marketing behaviour of coconut in Tanjavur district of Tamil Nadu. It was found that, lack of storage facilities, inadequate arrangements for grading, standardization, poor market information, low credit availability, inadequate transport mechanisms, etc. forced the farmers to sell their produce immediately after the harvest at low prices to the local traders. The factors such as farm size, economic motivation, and market decision were found to have a positive influence on the marketing behaviour, while credit orientation negatively affected the marketing behaviour of coconut growers.

Vasanthkumar *et al.* (2015) opined that the minor changes in the production and consumption of coconut oil were typically reflected in the price due to its highly elastic nature. Though there existed a fluctuation of prices in the coconut products from 1988 to 2015, an overall increasing trend of price was visible during this period. Randomness in price was visible throughout the study period, as the wavelengths of increasing and decreasing cycle didn't exhibit a uniform pattern. The bullish phase was recorded from September 2013 to August 2014. The price of copra in the Kozhikode market skyrocketed from Rs. 5,887 per quintals to Rs. 11, 475 per quintals during this period. Similarly, the price of coconut oil also increased from Rs. 8,620 to Rs. 17,524 per quintal. Moreover, they noted that the decreasing trend of coconut production in the four southern states remained the prime cause for the price fluctuation in the recent period.

Jayasekhar *et al.* (2016) analysed the efficiency of coconut marketing in Kerala and revealed that about 70 per cent of the farmers sold their produce through the village traders as raw coconut. The producer's share in consumer rupee was around 64 per cent and the market chain found to consume about 36 per cent share. Higher price spread indicated a lower share of the final price to the producer and reflected the low efficiency of the marketing channel. In addition, they also remarked that due to small and marginal holding size, farmers were not interested in the value addition of the produce. The farmers preferred to sell fresh coconut when the price was attractive which in turn, provided a remunerative amount to them immediately after the harvest.

Jnanadevan (2017a) propounded that the price of all coconut products was determined by the price of coconut oil and the supply-demand condition of coconut oil determined the growth and sustainability of coconut production in India. Of the total coconut oil produced in the country, about 50 per cent was consumed as edible oil, about 35 per cent was used for toiletry and soap sector, eight per cent was used in various industrial applications and the remaining seven per cent alone was exported.

2.6 MARKET INTEGRATION AND PRICE TRANSMISSION

Joseph (2004) examined the integration of domestic prices and international prices of selected plantation crops of Kerala using the Johansen co-integration approach. The high level of integration was noticed in black pepper followed by rubber and coffee. The markets were integrated even before liberalization in all plantation crops except cardamom, and the level of integration got accelerated in the post-liberalisation period. Thus, the liberalization policies transmitted the price signals in a better way and led to the high integration of domestic and world markets.

Parappurathu *et al.* (2008) scrutinized the spatial market integration and price transmission of major fish markets in India using a ten-year monthly price data. The price transmission and degree of price integration have differed across species. The most notable integration was observed in the mackeral species due to its high affordability across all income groups. Among different markets, a significant transmission of price signals was observed between Kerala and Tamil Nadu. Though Maharashtra was the major landing center, the price movement of this market was found independent of other markets. Moreover, the spatial integration between major shrimp markets in the country was negligible due to its better share in the world market.

Babu *et al.* (2009) evaluated the price response of coconut in India during 1976-77 to 2004- 05 and reported that the price was displaying an increasing trend throughout the study period. For coconut and its value-added products, prices manifested significant seasonal fluctuations with prices reaching a low during the peak production period, and reaching a high level during the slack production period. Even though the domestic price of copra and coconut oil seemed to be higher than the world price, a high integration was observed among these prices. Further, they added that the coconut industry in India has twirled around the price of coconut oil, and at the same time the price of coconut oil was determined by the market price and overall availability of other vegetable oils.

Bastine *et al.* (2010) analysed the extent of market integration between domestic and international markets of pepper using multiple co-integration frameworks. The trace test revealed the presence of three cointegrating vectors in the first period (1990-1999), while the number of cointegrating vectors increased to four in the second period (2000-2009). The co-integration analysis further exposed that liberalisation had improved the transmission of price signals between the domestic and the international markets and there existed a co-movement of prices.

Hossain and Verbeke (2010) investigated the impact of rice market liberalization in Bangladesh. Weekly wholesale prices of coarse rice over a period of three years were used to test the degree of market integration using cointegration and Vector Error Correction Model (VECM). The Johansen test revealed the presence of three cointegrating vectors and thereby established the stable long-run relationship between selected markets. The short-run dynamics of the time series data was tested using the VECM and showed the presence of weak integration in the short-run.

Khan *et al.* (2014) investigated the causality linkage among the three important sectors of the Malaysian economy viz. construction, manufacturing and mining, and quarrying. The quarterly time series data from 1991 to 2010 was used to study the pair-wise causality and direction of causality between the variables. The linkages among the selected three sectors were studied using Granger Causality test under restricted Vector Auto Regression (VAR) framework. The findings revealed that the construction had unidirectional backward linkages with mining and quarrying, and manufacturing sector, while the mining and quarrying sector had only forward linkages with construction and manufacturing sectors.

Selvi *et al.* (2014) used the cointegration and VECM framework to examine the spatial and temporal integration of domestic and international maize markets. The five leading maize markets from Madhya Pradesh, Rajasthan, Andhra Pradesh, Karnataka, and Tamil Nadu and two international markets from the United States and Argentina were purposively chosen for the study. The

domestic maize markets of Nizamabad, Davangere and international markets of Argentina were integrated with other markets each with three co-integrating vectors. The result confirmed the presence of a long run relationship between the variables. Further, the VECM approach also disclosed the existence of short-run disequilibrium between the markets. The estimated error correction coefficient was -0.28 per cent. It depicted that in the Tamil Nadu market the disequilibrium got corrected within a month by changes in its own prices with an adjustment speed of 28 per cent in the long-run.

Sundaramoorthy *et al.* (2014) analysed the bivariate cointegration between the commodities in the cotton value chain using the Johansen cointegration method. The result disclosed the presence of one cointegrating equation in all the combinations. It was observed from the exogenous test that the price of raw cotton influenced the price of yarn and price of cotton cloth. Any small change in the price of raw cotton in the long-run will influence the prices of yarn and cloth, while the yarn and cloth price did not influence the price of raw cotton. Thus, they conveyed the idea that the raw cotton prices were weakly exogenous, and the prices of yarn and cloth were endogenous. Therefore, they suggested the need for an appropriate pricing policy for raw cotton. Error correction mechanism provided clear-cut evidence of unidirectional causality from raw cotton to yarn and then to cotton cloth.

Ahmed and Kenji (2016) employed the Johansen co-integration test to check whether GDP of Ethiopia had any consistent relationship with macroeconomic variables like export-import, employment, and labour productivity growth. They also carried out VECM to analyse the long-run causality between GDP and the independent variables. Johansen test and VECM model confirmed the presence of long-run causality between GDP and independent variables. The result also revealed that there was no short-run causality running from export-import, employment and labour productivity growth on GDP in the short run.

Saima and Uddin (2017) attempted to study the relationship between budget deficit and public debt in Bangladesh using Johansen co-integration framework. The prerequisite of Johansen test required the existence of a unit root in the time series data, so they employed Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test to confirm the presence of a unit root. The result of the unit root test revealed that the series was non-stationary at the level form, but they became stationary after first differencing. In order to find out the long run relationship between the variables, they carried out Johansen cointegration techniques. Both trace test and maximum Eigen statistics were used to confirm the presence of co-integration. The result revealed the existence of one cointegrating equation at a five per cent significance level. The short-run properties of the cointegrated series were analysed using the VECM. The result proved the existence of unidirectional causality from public debt to the budget deficit, but not vice-versa.

Minimol (2018) explored the relationship between spot and future prices of crude oil in India using the Johansen co-integration framework. The computed trace statistics (63.22) was greater than the critical value (15.49) at five per cent significance level. Thus, the trace test rejected the null hypothesis of no co-integration among spot and futures markets. Similarly, the maximum eigen test also confirmed the presence of co-integration. They employed the VECM to study the short- run price relationship between the spot and future prices and observed that there was no short-run relationship between the variables.

2.7 SUGGESTIONS AND POLICY MEASURES TO IMPROVE THE COMPETITIVENESS OF COCONUT SECTOR

According to Aravindakshan (1995), the coconut industry in India mainly concentrated on the production of coconut oil. The traditional farmers were mostly producing coconut oil to meet their domestic requirements. To enhance the coconut production and to improve the condition of coconut farmers, attention should be given to the product diversification. To make the industry globally

competitive, the domestic farmers should hopefully look at the opportunities in the global market and act correspondingly. The study suggested the need for adopting the improved processing technologies which were already developed in other major producing countries like the Philippines, Indonesia, and Srilanka.

Singh *et al.* (2002) found that mono-cropping of coconut has led to poor economic returns for the coconut growers in Goa. Even though various coconut based farming systems exist in Goa; mixed or intercropping with jackfruit, mango, areca nut, and black pepper was observed as the common form of cropping pattern. The study revealed that the intercropping of coconut garden with crops like pineapple, banana, and black pepper was found to increase the economic return from the coconut garden.

Herman (2007) assessed the production and marketing aspects of coconut and its value-added products among the Asian and Pacific Coconut Community (APCC) during 1955 to 2004. With the exception of Indonesia, Philippines, and Samoa, the growth of coconut production in all other APCC member countries seemed to be negative. The study strongly suggested the establishment of networks or alliance among the stakeholders of coconut industries to strengthen the bargaining power of coconut farmers. Moreover, the APCC strongly advised to its member countries to focus more attention towards promoting free trade zones for coconut and in stimulating trade facilitation measures within the region.

Jnanadevan (2013) urged that the replanting of senile and unproductive palm with high yielding varieties will intensify the coconut production in the country. Amongst the various hybrids recommended for commercial cultivation, the Kalpa Sankara was quite tolerant to root (wilt) disease and is advised for cultivation in the root wilt affected tracts. Kalparaksha and Kalpasree were the tolerant varieties suggested by the CPCRI for root (wilt) affected areas. Moreover, the nursery programmes in the states should be focused to produce and supply only the high yielding hybrids or selected ecotypes suitable for different agro-climatic conditions. Timely harvesting was another tough task faced by the farmers due to the shortage of skilled labour. The initiatives of the CDB in

conducting a massive training programme in palm climbing using the mechanical device was found to be useful to mitigate the problem to a certain level.

Jayasekhar *et al*. (2014) examined the price fluctuations in coconut for the past ten years. The price was found to be low with relatively fewer price fluctuations during 2004-2010. From 2010 onwards, the price fluctuations are quite obvious and the prices started showing an increasing trend and reached peak levels during the mid of 2011. The shortage of supply due to declined productivity and high demand for coconut in the export and processing industry majorly led to the steep rise in the coconut price in the domestic market. Moreover, they added that any price rise due to the demand pull was always sustainable and the price rise will not last for a long time if it was caused due to supply factors. The situation in turn creates an ambiguity among farmers with regard to their approach towards coconut farming. Hence, they suggested the need of long-term price stabilization policies for the coconut and coconut products.

Jnanadevan (2014) opined that coconut varieties with reduced height facilitate the safe and effective management of coconut plantation, and is found to be generally preferred by the farmers. The coconut varieties with reduced height in gene banks need to be regenerated using the controlled pollination technique to ensure that these varieties are conserved true to type during successive generation.

According to Jnanadevan (2015), the quality planting material remained as the most important factor in achieving sustainable and profitable yield from any crop. Though annual demand for coconut seedlings was estimated as 100 lakh, the present production was only 35 lakh, and there existed a shortage of 65 lakh seedlings annually. The gap favored the private agencies to play a major role in the production and distribution of coconut seedlings. To become competitive, initiation should start from the grass root level, and the government should ensure the quality of planting material produced by both government and private agencies.

The increased competition from other edible oils and negative propaganda against the coconut oil lessened the demand for coconut oil in the domestic

market. Despite this fact, the major coconut producing countries were now focused more on product development and product diversification from coconut. As a result, increased demand for value-added coconut products occurred in the global market. This gave ample opportunities for domestic producers to seize the share of the international market (Swamy, 2015).

Thamban and Samsudeen (2015) argued that cultivation of improved varieties was one of the main strategies to enhance the productivity of coconut crop. Even though different institutions have released a large number of coconut varieties, the farmer's adoption level was less. The lack of availability of quality seedlings continued as the major problem in adopting the improved varieties. They also added that only quality planting material ensured high productivity due to the long gestation period and long productivity period of the crop.

Jayasekhar and Thamban (2016) explored the relationship between the international palm oil prices and Indian import duty structure for the palm oil during 2001-2013. In 2007-08, the global price of palm oil showed an uptrend. Consequently, the import duties on crude and refined palm oil were reduced drastically to zero and 7.5 percent, respectively from 2008 onwards, to moderate the domestic price of edible oils. The import duty for palm oil has to be dynamically adjusted to its international prices as palm oil prices act as an anchor to all edible oil prices. A bearish trend in palm oil price led to decrease the prices of all other edible oils and it further augments palm oil imports from neighbouring countries. Therefore, they suggested a need for re-calibrating the import duty structure to protect the domestic edible oil economy.

Gopalakrishnan (2018) stated that the fragmented nature and small size of coconut holding restricts the scale of operation and limited the scope for successful farming. Mobilization of farmers through Farmer Producer Organizations (FPOs) emerged as a novel idea in India to work together and reap the benefits through joint efforts. The main limitation faced by the small farmers was the failure to create scale of economies. Weak bargaining power, low marketable surplus, scarcity of capital, lack of market access, lack of market

information, poor infrastructure and communication failures were also seem to be the major restraints faced by the smallholders. Many coconut producing countries have started emulating the idea of farmer producer organization to mitigate the constraints faced by the small farmers. These organisations also ensure a reasonable profit to the small farmers through the scale of economies.

Supply deficit and swelling industrial demand has chiefly led to the price hike of coconut during the recent years. In January 2017, the price of coconut was found to be Rs. 2,769 per quintal. The coconut price was showing an increasing trend throughout the year and attained a high level of Rs. 4,950 per quintal in January 2018. In India 45 per cent of the total coconut production was used as mature nuts, 39 per cent used as copra and 16 per cent used as the tender nuts. Of the total mature nuts, nearly 90 per cent was used for domestic purposes and a meager 10 per cent was absorbed by the industry for producing value-added products. Therefore, to upgrade into a commercially vibrant sector, there is an urgent need for restructuring the existing consumption pattern by including more value-added coconut products in the consumption basket (Jnanadevan, 2018)

Thamban and Jayasekhar (2018) listed out the major limitations faced by the coconut farmers in Kerala. The predominance of small and marginal holdings, market fluctuations, the prevalence of senile and unproductive palms, low level of crop management practices, incidence of various pest and diseases, inadequate irrigation facilities, soil-related constraints, lack of skilled labour, and high wage rates have majorly affected the coconut cultivation in Kerala. Therefore, they emphasized the needs of appropriate research, extension and policy intervention to enable the coconut growers to mitigate their constraints and drive the sector towards fulfilling the goal of sustainability. Increasing crop productivity and reducing the cost of cultivation through better utilization of crop management technologies in the existing coconut garden was another important approach to be implemented for augmenting the income from coconut farming.

Methodology

3. METHODOLOGY

Methodology is an important component of research which outlines the approach to be adopted and identifies the method to be used. To analyse various objectives of the study, appropriate sampling design, data collection and tools of analysis play significant role. The methodology adopted in the present study is briefly presented under the following headings.

3.1 Description of the study area

3.2 Sampling procedure

3.3 Nature and sources of data

3.4 Analytical tools and techniques

3.1. DESCRIPTION OF THE STUDY AREA

In this section an attempt has been made to describe the geography, land utilization pattern and cropping pattern of Kerala state, with special reference to Thiruvananthapuram, Thrissur and Kozhikode districts.

3.1.1 Kerala

Kerala, historically known as **Keralam**, is the southernmost Indian state situated on the Malabar Coast. The state is bordered by Karnataka to the North and Northeast, Tamil Nadu to the East and South, and the Lakshadweep Island to the West. Kerala lies between $08^0$17'30" and $12^0$47'40" of North latitude and $74^0$27'47" and $77^0$37'12" of East longitude. It has an area of 38,863 square kilometers and occupies 1.2 per cent of the total geographical area of the country (Fig. 3.1). As per 2011 census, Kerala is the thirteenth-largest Indian state by population and population density of the state is 860 per square kilometer. The state is divided into 14 districts for administrative convenience.

The land utilization pattern of Kerala state during 2016-17 is presented in Table 3.1. The net area sown in the state was around 51.86 per cent of the

geographical area and the area sown more than once was 14.63 per cent of the geographical area. Forest land accounted for 27.83 per cent of the total geographical area of the state while the land put to non-agricultural uses were only 11.37 per cent. Agriculture continued to be the most important and the single largest sector of the state's economy in terms of income and employment. In spite of the significant advances in industrial and service sectors, agriculture continues to be the largest provider of employment and livelihood both at the national and state level. Major crops grown comprise of seasonal crops (paddy, pulses, tapioca, vegetables, sweet potato, tubers, groundnut, ginger, turmeric, cotton, tobacco, onion and tur), annual crops (sugarcane, banana, plantain, pineapple and betel leaves) and perennial crops (coconut, arecanut, cashew, mango, jack, tamarind, pepper, rubber, tea, coffee, cardamom, cloves, nutmeg, cinnamon, cocoa, papaya etc). The cropping pattern of Kerala during 2016-17 is reported in Table 3.2. It could be observed from the table that out of the total cropped area, the oil seed crop accounted for the highest area (30.35%), followed by plantation crops (26.34%), fresh fruits (12.66%) and spices and condiments (10.30%). Coconut is the main oilseed crop grown in the state and it accounted for about 99.63 per cent of total oilseed crop in the state.

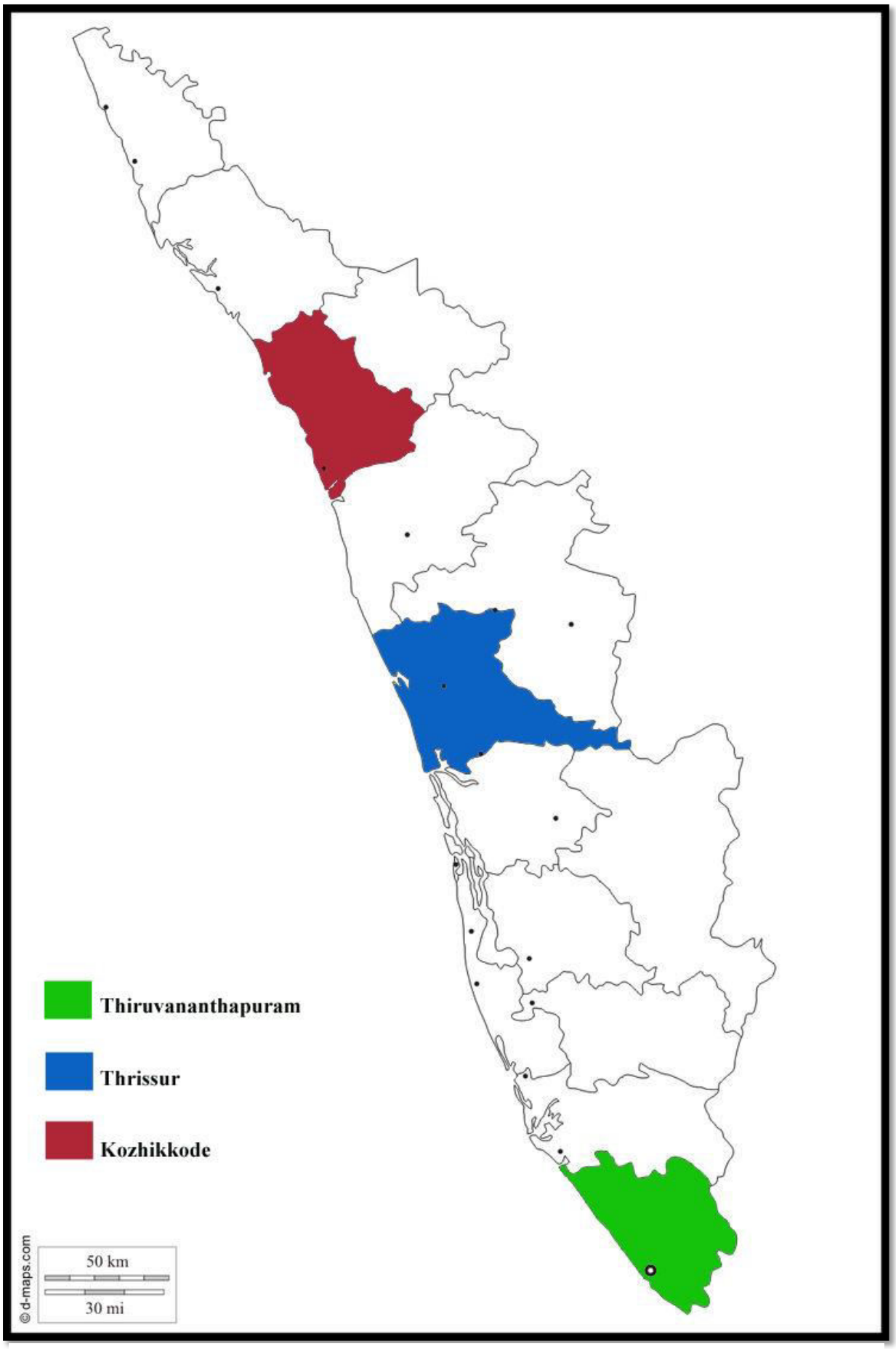


Fig. 3.1 Map of the study area

Table 3.1 Land utilization pattern of Kerala during 2016-17

Particulars	Area (ha)	Percentage to total geographical area
Total geographical area	3886287	100.00
Forest	1081509	27.83
Land put to non-agricultural uses	441934	11.37
Barren and uncultivable land	11780	0.30
Land under miscellaneous tree crops	2450	0.06
Cultivable waste	101379	2.61
Fallow other than current fallow	55530	1.43
Current fallow	72008	1.85
Marshy land	106	0.00
Still water	98343	2.53
Water logged area	3210	0.08
Social forestry	2556	0.07
Net area sown	2015482	51.86
Area sown more than once	568525	14.63
Total cropped area	2584007	66.49

Source: GOK (2017), Agricultural Statistics 2016-17

Table 3.2 Cropping pattern of Kerala during 2016-17

Crop	Area (ha)	Percentage to total cropped area
Cereals and millets	171648	6.64
Pulse	1738	0.07
Sugar crop	3363	0.13
Spices and Condiments	266130	10.30
Fresh fruits	327210	12.66
Dry fruits	41661	1.61
Tapioca	68664	2.66
Tubers	18462	0.71
Vegetables	46732	1.81
Oil seeds	784327	30.35
Fibers, Drugs and Narcotics	496	0.03
Plantation crop	680635	26.34
Other non-food crops	172942	6.69
	2584008	100.00

Source: GOK (2017), Agricultural Statistics 2016-17

3.1.2 Description of the Selected Districts in the Study Area

The general features of Thiruvananthapuram, Thrissur and Kozhikode districts are presented here which constitutes the area under study.

3.1.2.1 *Thiruvananthapuram District*

Thiruvananthapuram district lies between $8^0$17' and $8^0$54' North latitude and $76^0$41' and $77^0$17' East longitudes. It is the Southernmost district and the largest city in the coastal state of Kerala. The district stretches 78 kilometers along the shores of the Arabian Sea on the west, Kollam district lies on the North and Tirunelveli and Kanyakumari districts of Tamil Nadu on the East and South, respectively (Fig. 3.2). The district has an area of 2,187 square kilometers and a population of 3,301,427 (as per the 2011 census). It is the densest district in Kerala with 1,508 inhabitants per square kilometer. The district has a sex ratio of 1,088 females for every 1,000 males and a literacy rate of 93 per cent.

Fig. 3.2 Map of Thiruvananthapuram district

It could be observed from the Table 3.3 that the total cropped area in the district was 72.67 per cent of the total geographical area. The net area sown in the district was around 58.96 per cent and the area sown more than once was 13.70 per cent of the geographical area. While forests accounted for 22.79 per cent of the area and the share of land put to non-agricultural uses was 15.10 per cent. The major crops grown in the districts are coconut, rubber, tapioca, plantain, jack, mango and banana. Coconut, rubber and tapioca accounted for about 44.32, 20.25 and 9.20 per cent of total cropped area of the district respectively. The cropping pattern is given in Table 3.4.

3.1.2.2 *Thrissur District*

Thrissur, situated in the central part of the state lies between $10^0$10' and $10^0$46' North latitude and $75^0$57' and $76^0$54' East longitudes. Renowned as the cultural capital of Kerala, the district is also known as 'Land of Poorams'. It is bordered on the North by Malappuram district, on East by Coimbatore district of Tamil Nadu, on the South by Ernakulam district and on the West by the Arabian Sea (Fig. 3.3). The district has an area of 3,029 square kilometers and a population of 3,121,200 (as per the 2011 census). The district has a population density of 1,031 inhabitants per square kilometer. Thrissur district has a sex ratio of 1,109 females for every 1,000 males and a literacy rate of 95 per cent.

Fig. 3.3 Map of Thrissur district

It could be observed from the Table 3.3 that the total cropped area in the district was 56.44 per cent of the total geographical area. The net area sown in the district was around 42.41 per cent and the area sown more than once was 14.03 per cent of the total geographical area. Forests accounted for 34.21 per cent of the area of the district and the share of land put to non-agricultural uses was 12.88 per cent. The important crops grown in the districts are coconut, paddy, rubber, mango, plantain, and jack fruit. Coconut, paddy and rubber accounted for 47.08, 12.34 and 9.15 per cent of total cropped area of the district respectively. The cropping pattern is given in detail in Table 3.4

3.1.2.3 *Kozhikode District*

Kozhikode district lies between $11^0$07'22" and $11^0$48'32" North latitude and $75^0$30'00" and $76^0$08'20" East longitudes. Kozhikode, formally known as Calicut is the third largest city in Kerala (Fig. 3.4). Kozhikode is known as "City of spices" for its role as the major trading point of eastern spices. The district has an area of 2,346 square kilometers and a population of 3,086,293 (as per the 2011 census). The district has a population density of 1,316 inhabitants per square kilometer. Kozhikode has a sex ratio of 1,098 females for every 1,000 males and a literacy rate of 95 per cent.

Fig 3.4 Map of Kozhikode district

It could be observed from the Table 3.3 that the total cropped area in the district was 84.55 per cent of the total geographical area. The net area sown in the district was around 62.96 per cent and the area sown more than once was 21.59 per cent of the total geographical area. Forests accounted for 17.64 per cent of the area of the district and the share of land put to non-agricultural uses was 14.25 per cent. The important crops grown in the districts are coconut, rubber, arecanut, jack fruit and mango. Coconut, rubber and arecanut accounted for 60.05, 11.05 and 5.17 per cent of total cropped area of the district respectively. The cropping pattern is given in detail in Table 3.4.

Table 3.3 Land utilization pattern of selected districts

Particulars	Thiruvananthapuram		Thrissur		Kozhikode	
	Area (ha)	Percentage to total geographical area	Area (ha)	Percentage to total geographical area	Area (ha)	Percentage to total geographical area
Total geographical area	218781	100.00	302919	100.00	234641	100.00
Forest	49861	22.79	103619	34.21	41386	17.64
Land put to non-agricultural uses	33025	15.10	39026	12.88	33445	14.25
Barren and uncultivable land	154	0.07	91	0.03	603	0.26
Permanent pastures and other grazing	0	0.00	0	0.00	0	0.00
Land under miscellaneous tree crops	20	0.01	201	0.07	90	0.04
Cultivable waste	401	0.18	10170	3.36	2862	1.22
Fallow other than current fallow	703	0.32	6031	1.99	955	0.41
Current fallow	2884	1.32	9813	3.24	1938	0.83
Marshy land	1	0.00	0	0.00	5	0.00
Still water	2696	1.23	5034	1.66	5041	2.15
Water logged area	15	0.01	318	0.10	547	0.23
Social forestry	22	0.01	147	0.05	37	0.02
Net area sown	128999	58.96	128469	42.41	147732	62.96
Area sown more than once	29980	13.70	42509	14.03	50657	21.59
Total cropped area	158979	72.67	170978	56.44	198389	84.55

Source: GOK (2017), Agricultural Statistics 2016-17.

Table 3.4 Cropping pattern of selected districts

Crop	Thiruvananthapuram		Thrissur		Kozhikode	
	Area in hectares	Percentage to total cropped area	Area in hectares	Percentage to total cropped area	Area in hectares	Percentage to total cropped area
Cereals and millets	1392	0.88	21100	12.34	1987	1.00
Pulse	47	0.03	0	0.00	8	0.00
Sugar crop	32	0.02	125	0.07	127	0.07
Spices and condiments	4238	2.66	16727	9.78	16050	8.09
Fresh fruits	23447	14.75	22788	13.33	26597	13.41
Dry fruits	1043	0.66	1511	0.88	1756	0.89
Tapioca	14628	9.20	1172	0.69	1477	0.74
Tubers	1312	0.83	491	0.29	758	0.38
Vegetables	3662	2.30	3099	1.81	2544	1.28
Oil seeds	70512	44.35	80780	47.25	119130	60.05
Fibers, Drugs and Narcotics	16	0.01	5	0.00	8	0.00
Plantation crop	33228	20.90	16236	9.50	22769	11.48
Other non-food crops	5422	3.41	6944	4.06	5178	2.61
Gross Cropped Area	158979	100.00	170978	100.00	198389	100.00

Source: GOK (2017), Agricultural Statistics 2016-17.

3.2 SAMPLING PROCEDURE

In India, coconut cultivation is mainly concentrated in the southern states and among them Kerala's contribution to the area and production of coconut is significantly very high. Hence the present study was undertaken in Kerala, the land of coconut. For primary data collection multistage sampling procedure was adopted. In the first stage, to represent the entire state, three districts were purposively selected based on high coconut production from southern, central and northern region. In the southern region, Thiruvananthapuram district was selected and it has an area of 70,467 ha and production of 573 million coconuts. Thrissur district was selected from the central region and has an area of 80,504 ha and has a production of 500 million coconuts. From the northern part Kozhikode district was selected based on high production and it has an area of 1,19,064 ha and has a production of 837 million coconuts. From each of the selected districts, one block was selected based on high production of coconut. The block, thus selected was Kilimanoor from Thiruvananthapuram district, Mathilakam from Thrissur district and Balussery from Kozhikode district. At the third stage, two Panchayats from each block were randomly chosen. The selected Panchayats from Kilimanoor blocks were Navaikulam and Karavaram. Similarly from Mathilakam block the Panchayats selected were Perinjanam and Eriyad and Balussery and Ulliyeri Panchayats were selected from Balussery block. At the final stage, comprehensive lists of coconut farmers in each of the Panchayats were collected from the Krishibhavans and from the list 15 farmers were randomly selected from each Panchayat. So the total sample size constituted 90 farmers (Fig. 3.5).

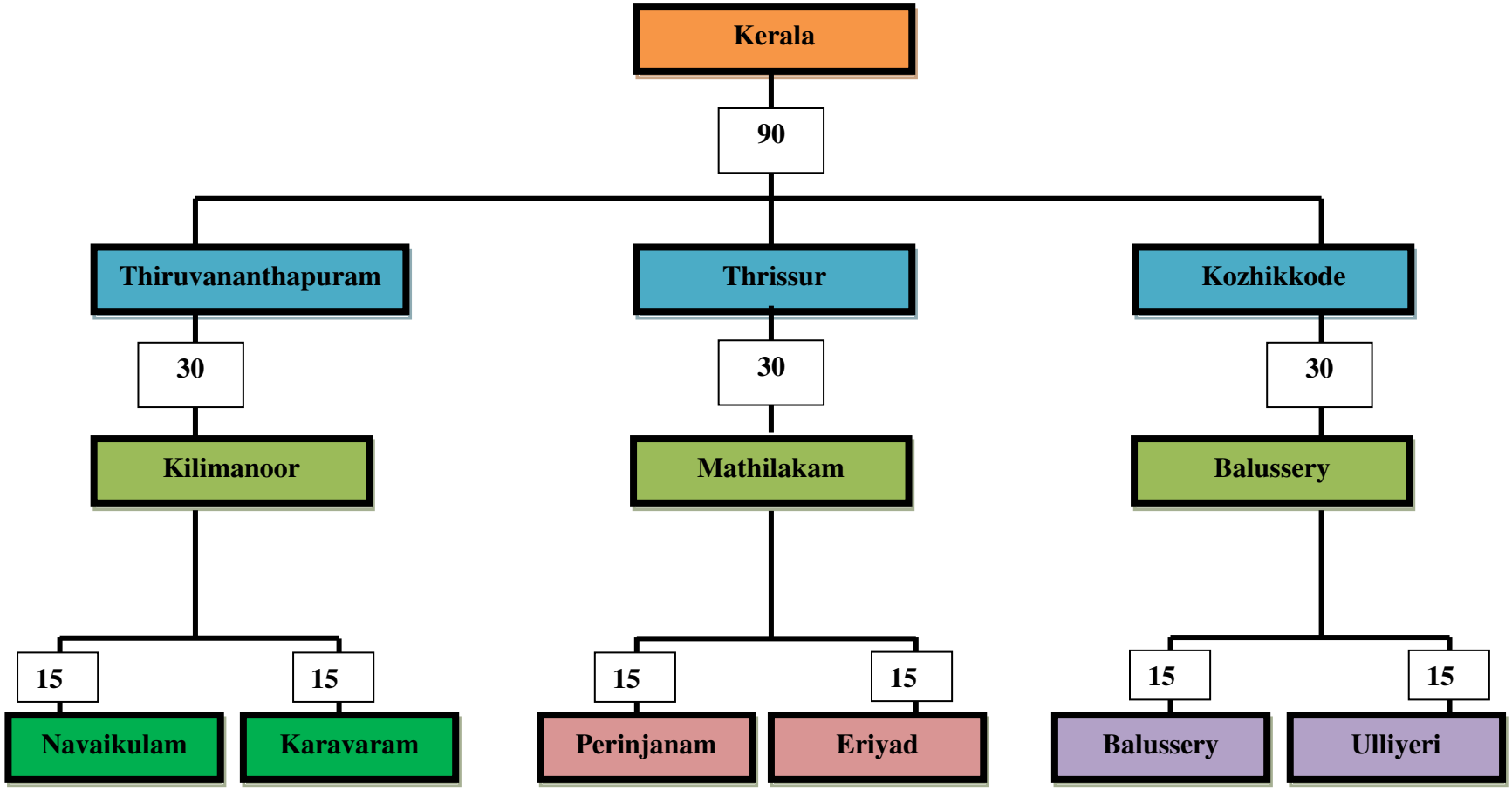


Fig. 3.5 Distribution of samples

In order to understand the cost of cultivation, cost of marketing and constraints in coconut production and marketing, primary data was collected from the selected farmers using pretested interview schedule by personal interview method. The cost incurred for establishing a new coconut garden was collected from the cultivators who recently started coconut cultivation in the study area. The marketing related information was also collected from 45 market intermediaries (15 from each district) and export related details were collected from 15 exporters (from Kerala) and thus making a total sample size of 150. Besides, Focus Group Discussions (FGDs) with farmers and traders were employed to evolve suitable suggestions from their perspective to improve the performance of coconut trade from Kerala.

3.3 NATURE AND SOURCES OF DATA

Both primary and secondary data were used for analysing the specific objectives of the study. For studying the impact of edible oil imports on the coconut economy of India, import data of major edible oils pertaining to the period 1980-81 to 2016-17 were collected from different sources like EXIM data bank (Government of India), Directorate General of Commercial Intelligent and Statistics (DGCI&S), Directorate General of Foreign Trade (DGFT) and FAO statistics. The import and export data of coconut products, both in quantity and value terms were collected from Coconut Development Board (CDB) under the Ministry of Agriculture, Government of India and EXIM data bank (Government of India). The domestic price series of coconut oil in three major markets of Kerala were also collected from CDB. Similarly, the international price series of coconut oil and other major edible oils were taken from the World Bank commodities price data.

The primary data for the present study was collected using well-structured and pretested schedules through a survey of 90 farmers in the selected districts of Kerala. The data pertaining to the cost details, yield, returns, price data of input and output, details of marketing, constraints in production and marketing were elicited from the

farmers. To find out the efficiency of selected coconut markets, data was collected from 45 market intermediaries through a well structured schedule. The data pertaining to different marketing channels, types of marketing, cost and margin associated with different marketing channels and constraints in coconut marketing, etc. were elicited through personal interview method to have relevant, comprehensive and precise data. The details regarding the export of coconut and its products, the cost associated with exporting and constraints faced by the exporters was obtained from the coconut exporters of the study area. Besides, the details of shipment charges and other cost associated with exporting were also collected from the freight forwarders to get a clear and precise data.

3.4 ANALYTICAL TOOLS AND TECHNIQUES

For the purpose of fulfilling the specific objectives of the study, data were analysed using the following techniques.

3.4.1 Exponential Growth Rates

Exponential growth rates were worked out to compare the export of different coconut products from India. For getting a clear picture, the entire study period, i.e., from 1980-81 to 2016-17 was divided into three phases. The first phase starts from 1980-81 to 1993-94, the pre-liberalization period characterized by the minimum import of edible oil. The second phase starts from 1994-95 to 2007-08, frequent changes in the tariff structure observed during this period and reduction in the import tariff favoured huge import of palm oil and other substitute oils into the Indian markets. The third phase starts from 2008-09 to 2016-17, a significant change in the export of coconut and coconut products observed during this period and the trade balance of coconut found to become positive throughout the period. Besides, exponential growth rates were also calculated to compare the growth rate of edible oil imports and coconut oil prices in Kerala.

The growth rate was worked out using the exponential growth function of the form

$$Y_t=ab^tc^u$$

Where,

Y_t= Dependent variable for which growth rate is to be estimated

a = Intercept

b = Regression co-efficient

t = Time variable

u = Error term

The exponential growth rate was worked out by transforming the equation to the log linear form as

$$\text{Ln } Y_t = \ln a + t \ln b + u$$

The method of ordinary least square was adopted to estimate the coefficient (b's).

The compound growth rate in percentage (G) was calculated using the relationship

$$G = \{(\text{Antilog of b}) - 1\} \times 100$$

The significance of the growth rates was tested using the student's t- test statistic

3.4.2 Instability Index

In order to study the variability in the export of different coconut products, the formula suggested by Cuddy and Valle (1978) was used.

$$\text{Instability index} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100 \times \sqrt{(1 - R^2)}$$

3.4.3 Revealed Symmetric Comparative Advantage (RSCA)

The RSCA analysis was done for the selected coconut products. RSCA measures the comparative advantage or disadvantage of a country with respect to another country or group of countries. The value of RSCA ranges from -1 to +1.

Positive RSCA value indicates the comparative advantage of the country in export of the commodity and vice versa. RSCA index is calculated using the formula

$$\text{RSCA} = \frac{(\text{RCA}-1)}{(\text{RCA}+1)}$$

Where,

$RCA_{ij}=(X_{ij}/X_{wj})/(X_i/X_w)$

$X_{ij}=i^{th}$ country's export of a commodity j in value terms

X_{wj}= World export of commodity j in value terms

X_i= Total export of country i in value terms

X_w= Total world exports in value terms

3.4.4 Policy Analysis Matrix (PAM)

The Policy Analysis Matrix (PAM) developed by Monke and Pearson (1989) was used for computing the competitiveness and comparative advantage of coconut trade from Kerala. PAM has been used in several works to evaluate competitiveness and comparative advantage (Mohanty *et al.,* 2003; Basavraj *et al.,* 2013; Kanaka and Chinnadurai, 2013; Priyanka *et al*., 2015), and the effect of government interventions and agricultural policies. PAM is a double-accounting technique that summarizes the budgetary information for farm and post farm activities. Even though the output of PAM tables seems to be simple, it is theoretically rigorous and derived from social cost-benefit analysis and international trade theory in economics (Masters and Winter-Nelson, 1995). In brief, PAM is a product of two accounting identities; one defining profitability and the other measuring the effects of divergences (distorting policies and market failures) as the difference between observed prices and social prices. PAM methodology mainly uses two types of prices, private prices (market or financial prices) are prices at which goods and services are actually exchanged in the market. Social prices are the prices, which would prevail in the absence of any policy distortions (such as taxes or subsidies) and market failures (such as monopolies).

PAM method rest upon a familiar identity: Profit = Revenue-Cost. Unlikely from other methods, in PAM, the cost is divided into two components, i.e., tradable components (those input that are traded on the international market) and non-tradable components or domestic factors (those inputs that are not traded internationally). In general, chemical fertilizers, pesticides and hybrid seeds were included under the tradable components and bio fertilizers, bio pesticides, factors like land, labour, working capital and fixed capital were included under the non-tradable components. The basics of working in PAM are discussed below with the help of Table 3.5.

Table 3.5 Policy Analysis Matrix (PAM) framework

Particulars	Revenue	Cost		Profit
		Tradable inputs	Domestic factors	
Valued at private prices	A	B	C	D[1]
Valued at social prices	E	F	G	H[2]
Divergence	I[3]	J[4]	K[5]	L[6]

Source: Monke and Pearson (1989)

Note: [1]Private profit, D= A-(B+C) [4]Input transfers, J=B-F

[2]Social profit, H= E-(F+G) [5]Factor transfers, K=C-G

[3]Output transfers, I= A-E [6]Net policy transfers, L= D-H

3.4.4.1 Private Profitability

The PAM matrix is presented in Table 3.5. The data in the first row provides a measure of private profitability (D), defined as the difference between observed revenue (A) and costs (B+C) valued at actual market prices. It shows the competitiveness of a commodity with respect to present technologies, output, and inputs valued at the current market prices. (Yao, 1997; Mohanty *et al.,* 2003; Makama *et al*., 2016).

3.4.4.2 Social Profitability

The second row in the matrix provides the social profitability measured at social prices that reflect social opportunity costs. The social profitability measures the comparative advantage or efficiency of the system. A positive social profit indicates that the country uses scarce resources efficiently and has a static comparative advantage in the production of that commodity at margin (Makama *et al*., 2016). A negative social profit indicates that the sector cannot sustain its current output without assistance from the government.

3.4.4.3 Policy Transfers

Transfers are shown in the third row of the PAM. If market failures are unimportant, these transfers measure mainly the effects of distorting policy. The difference between the private and social value of revenues, costs (both tradable and domestic factors) and profits could be explained by the policy interventions. The output transfer (I) can be either positive or negative. Private price of output greater than that its social prices indicates a positive transfer provided by the policy which would cause the production system to realize higher private profits than it could attain without the aid of the policy. A divergence in tradable input prices (J) and domestic factor prices (K) can be either positive (causing an implicit tax or transfer of resources away from the domestic system) or negative (causing an implicit subsidy or transfer of resources in favour of the domestic system) (Angles, 2012; Khai and Yabe, 2013).

3.4.4.5 Net Policy Transfer

The net transfer is the difference between private and social valuations of revenues and costs. It represents the sum of output, tradable inputs and factor transfers. It is therefore an overall measure of the difference between private and social profits and it measures the overall effects of all policies (Monke and Pearson, 1989; Pearson *et al*., 2003).

3.4.4.6 Trade Indicators Derived from PAM

The important indicators of trade like Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost (DRC) ratio, Social Benefit Cost (SBC) ratio and Producer Subsidy Equivalent (PSE) were computed and compared using the PAM framework.

3.4.4.6.1 Nominal Protection Coefficient (NPC)

NPC is a simple indicator of the incentives or disincentives and is the ratio of domestic price to a comparable world (social) price. NPC of greater than unity indicates effective incentives to producers compared to the free trade scenario. If NPCI >1, the domestic input cost is higher than the input cost at world prices and the system is taxed by policy and if NPCI <1, the domestic price is lower than the comparable world price and the system is subsidized by policy (Pearson *et al*., 2003; Ogbe *et al*., 2011; Angles, 2012). The NPCO measures the effect of policy intervention on output prices. NPCO less than one indicate that domestic farm gate price is less than the international price for output. This confirms the presence of taxes or any other policy that is detrimental to the realization of maximum output. While NPCO >1 indicates the presence of subsidies and it shows that private price of good has been kept higher than the border price. This means that government policies provide incentives to the local producers (Pearson *et al*., 2003; Ogbe *et al*., 2011)

3.4.4.6.2 Effective Protection Coefficient

EPC is an improvement over NPC to the extent that it takes care of variation in domestic and international prices of tradable inputs. It is defined as the ratio of value added at private prices (A–B) to value added at social prices (E–F). A value greater (or less) than one indicates a net subsidy (or net tax) to value added (Monke and Pearson, 1989). In addition, an EPC value of greater than one suggests that government policies provide positive incentives to producers compared to free trade,

while the values less than one indicate that producers are not protected through policy interventions (Mohanty *et al*., 2002).

3.4.4.6.3 Domestic Resource Cost (DRC)

DRC measures the efficiency of utilization of domestic factors in the analyses of production systems. The DRC is the most useful indicator and is used to compare comparative advantage among agricultural commodities. The index is calculated as the ratio of shadow value (opportunity cost) of non-tradable factors used in an activity per unit of tradable value added (G/E-F). The DRC indicates whether the use of domestic resources is socially profitable (DRC< 1) or not (DRC >1). If the DRC<1, the country has comparative advantage in the production of particular commodity and if the DRC>1 it signifies that the country do not possess any comparative advantage in production of the analysed commodity (Monke and Pearson, 1989; Pearson *et al*., 2003).

3.4.4.6.4 Social Benefit Cost (SBC) ratio

A good alternative for the DRC is the Social Benefit Cost (SBC) ratio, which avoids cost classification errors in the calculation of DRC ratio. In the PAM context, SBC is the ratio of revenue at social prices to the sum of costs at social prices (E/(F+G)) (Masters and Winter-Nelson, 1995; Pearson *et al*., 2003). An enterprise with SBC ratio greater than unity suggests greater net social benefits than the social costs and therefore the enterprise enjoys comparative advantage, while SBC ratio is positive but less than unity implies that it does not have such an advantage (Fang and Beghin, 1999; Fatah *et al.,* 2015; Priyanka *et al*., 2017).

3.4.4.6.5 Producer Subsidy Equivalent (PSE)

Producer Subsidy Equivalent (PSE) is the aggregate measures of the total monetary value of the assistance to output and inputs on a commodity by commodity

basis, associated with the government policies (Priyanka *et al*., 2017). The PSE is calculated as net transfer divided by total revenue at private prices (L/A) and it includes policy effects on all the inputs and factors (Toure *et al*., 2013). The negative value of PSE indicates an overall transfer from producer to consumer and taxpayers while the positive value means the overall transfer from consumer and taxpayers to producer (Toure *et al*., 2013; Priyanka *et al*., 2017).

3.4.4.7 Determination of Social Values for Tradable and Non-tradable Goods

One of the tedious tasks in constructing the PAM framework is the determination of social values for both output and input (Yao, 1997; Basavaraj *et al*., 2013). The presence of market failure, market imperfections, monopolies and existence of distorting government policies can diverge the social valuation from private valuation. The social valuation is divided into social valuation of tradable and non-tradable inputs and outputs. For internationally traded goods, world prices [Free On Board (FOB) prices for export and Cost Insurance and Freight (CIF) for import] were used as the reference prices and adjusted for transportation and marketing costs to be comparable with farm gate prices or wholesale prices. The procedure followed for the calculation of export and import parity price is reported in Table 3.6 and Table 3.7 respectively. In case of commodities that are not traded internationally figuring out of social prices would be very difficult task. In present study marginal value product approach (Gulati and Kelly, 2000; Basavaraj *et al*., 2013; Kanaka and Chinnadurai, 2013) was used to compute the social cost of non tradable components. Thus, the social price of the i^{th} non-traded input can be calculated as factor share (S_i) of various inputs (X_i) to the mean value of inputs, output (Y) and its price (P_y), as given in the equation below

$$PX_i = [(S_i/X_i) \times Y] P_y$$

Table 3.6 Calculation of import parity price

International prices	FOB prices at point of export	Given
	Freight to point of import	Given
	Insurance	Given
	CIF at point of import	FOB+freight+insurance
Currency conversion	Exchange Rate	Given
	Exchange Rate Premium (ERP)	Given
	Equilibrium Exchange Rate (EER)	ER×(1+ERP)
	CIF in domestic currency	EER× CIF at point of import
Weight conversion	Weight conversion factor	Given
	CIF in domestic currency and weight	CIF in domestic currency/weight conversion factor
Distribution between port and wholesale market	Local transport and marketing cost to wholesale market in social prices	Given
Result	Import parity value at wholesale market	CIF in domestic currency and weight + distribution cost

Source: Monke and Pearson (1989)

Table 3.7 Calculation of export parity price

	Export parity price	
International prices	CIF prices at point of import	Given
	Freight to point of import	Given
	Insurance	Given
	FOB at point of export	CIF – freight-insurance
Currency conversion	Exchange Rate (ER)	Given
	Exchange Rate Premium (ERP)	Given
	Equilibrium Exchange Rate (EER)	ER×(1+ERP)
	FOB in domestic currency	EER× FOB at point of export
Weight conversion	Weight conversion factor	Given
	FOB in domestic currency and weight	FOB in domestic currency/weight conversion factor
Distribution between port and wholesale market	Local transport and marketing cost to wholesale market	Given
Result	Export parity value at wholesale market	FOB in domestic currency and weight-distribution cost

Source: Monke and Pearson (1989)

The NPV- PAM approach is used for perennial crops, such as tree crops, that produce outputs over a number of years (Pearson *et al*., 2003). As coconut is a perennial crop, the research also employed the same approach for the construction of PAM. Here the PAM framework is constructed based on certain assumptions and it includes

1. The average economic life span of coconut palm was assumed to be 50 years and out of this first seven years were considered as pre-bearing or establishment period.
2. Even though coconut is mostly cultivated as an intercrop in Kerala, here we assumed that the crop was planted as monocrop.
3. In Kerala, coconut plantations are tiny or fragmented in nature; despite this fact the cost details and yield realized are converted for one hectare scale by assuming a contiguous plot
4. Average price realized during the 2016-17 period was considered for private price calculation and for social price calculation world prices adjusted for transportation and marketing cost for the corresponding periods were used
5. The cost of agricultural land in India is primarily the land rent which is paid on an annual basis and it cannot be considered as the true opportunity cost of land (Gulati and Kelly, 2000). Hence, in the present study, the rent paid to land was not accounted in cost computations (private and social prices).

3.4.5 Marketing Efficiency of Selected Market

3.4.5.1 Marketing Channel

A marketing channel is the path by which the agricultural products move from the producer to the final consumer through different intermediaries. Intermediaries may be local traders or village merchants, brokers, processors, wholesalers, commission agents, and retailers. For the estimation of marketing cost and marketing margin, price spread, producer's share in consumer's rupee and efficiency of the

marketing channels, the methodology described by Acharya and Agarwal (1987) was used.

3.4.5.2 Marketing Cost

Marketing cost is the actual expenses incurred in moving the products from point of production to the point of consumption. The cost of performing the various marketing functions carried out by the farmer and market intermediaries at different stages of marketing are included in the marketing cost.

$$MC = C_f + C_{m1} + C_{m2} + \ldots\ldots + C_{mn}$$

Where,

MC = Total marketing cost

C_f= Cost paid by the producers from the time the produce leaves the farm till he sell it, and

C_{mi} = Cost incurred by the i^{th} middleman in the process of buying and selling the product

3.4.5.3 Marketing Margin

The intermediaries or middlemen make some profit to remain in the trade after meeting the cost of the function performed. Marketing margin is the profit of various market functionaries involved in moving the produce from initial point of production till it reaches the ultimate consumers. The absolute value of marketing margin varies from channel to channel, market to market and time to time.

Absolute margin of i^{th} middleman (Am_i)

$$Am_i = Pr_i - (Pp_i + Cm_i)$$

Where,

Pr_i = Sale price of i^{th} middleman

Pp_i = Purchase price of i^{th} middleman

Cm_i = Cost incurred in marketing for i^{th} middleman

3.4.5.4 Price Spread

Price spread (farm retail spread) is defined as the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of the farm produce and is expressed as a percentage of the consumer's price. The price spread includes both the marketing cost and marketing margin. In the present study, price spread was estimated by the concurrent margin method.

Price spread= consumer price-producer price.

3.4.5.5 Producer's Share in the Consumer's Rupee

It is the price received by the farmer expressed as a percentage of the retail price (i.e., price paid by the consumer). The producer's share in the consumer's rupee was calculated with the help of the formula,

$P_s = (P_p/C_p) \times 100$

P_s= Producer's share in consumer's rupee (Percentage)

P_p= Producer's price

C_p = Consumer's price

3.4.5.6 Marketing Efficiency

The movement of goods from producers to consumers at the lowest possible cost, consistent with the provision of the services desired by the consumer, may be

termed as efficient marketing. The economic efficiency of markets is calculated using the Shepherd's formula as follows (Acharya and Agarwal, 1987).

ME= V/I

Where,

ME = Marketing efficiency

V = Consumer's price

I = Total marketing cost

3.4.6 Market Integration and Price Transmission

3.4.6.1 Market Integration

The market integration explains the relationship between the prices in the two or more markets that are separated spatially. Increased integration among the market is a pre-condition for the success of liberalization as correct transmission of price signals is required for farmers to realize the price advantage as well as to specialize in production. The nature and extent of market integration among domestic and international market of coconut oil during different time periods were analysed in a multiple cointegration framework. The details of the models are described below.

3.4.6.2 Model of Multiple Cointegration Analysis

The nature and extent of market integration among domestic coconut oil market and international edible oil market during the periods of significant policy changes were analysed in a multiple cointegration framework developed by Johansen (1988) and extended by Johansen and Juselius (1990). Price integration of domestic coconut oil with international edible oil markets like international coconut oil, international groundnut oil, international palm oil and international soybean oil were

analysed for three different time periods, 1980-81 to 1993-94, 1994-95 to 2007-08 and 2008-09 to 2016-17 using monthly price data.

3.4.6.3 Testing Stationarity

Before conducting cointegration tests, it is necessary to examine the univariate properties of the data and confirms that all the price series are non-stationary and integrated of the same order. The Dicky Fuller (DF) tests and the Augmented Dickey- Fuller (ADF) tests were performed to confirm that all the price series are non-stationary at levels and integrated of the same order. These tests are necessitated when a time series is non-stationary because the usual t-test is inappropriate to test the null hypothesis. For studying the stationarity, ADF test was applied by running the regression of the following formula

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t\_1} + \epsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

$$\Delta Y_t = Y_t - Y_{t-1},\ \Delta Y_{t-1} = (Y_{t-1} - Y_{t-2}),\ \Delta Y_{t-2} = (Y_{t-2} - Y_{t-3}), \text{ etc.}$$

ϵ_t is a pure white noise error term, t is the time trend effect, and m is the optimal lag value. The null hypothesis is that δ, the coefficient of Y_{t-1} is zero. The alternative hypothesis is $\delta < 0$. A non-rejection of the null hypothesis suggested that the time series under consideration is non-stationary (Gujarati *et al*., 2009).

3.4.6.4 Cointegration Analysis Using Johansen Methodology

In econometrics, cointegration analysis is used to estimate stationary linear relations (cointegration) between non stationary time series variables. The Vector Auto Regressive (VAR) model has been widely applied to model cointegration system. Cointegration is said to exist between two or more non-stationary time series if they possess the same order of integration and a linear combination (weighted average) of these series is stationary. Johansen Juselius

maximum likelihood procedure (Johansen and Juselius, 1990) is the most applicable method in the case of a system of variables since it permits the existence of cointegration between the system of variables without imposing any bias on the estimates.

The Johansen procedure examines a VAR model of Y_t, an (n×1) vector of variables that are integrated of the order one, i.e., I(1) time series. This VAR can be expressed as Equation (2)

$$\Delta Y_t = \mu + \sum_{i=1}^{p-1} \Gamma_i Y_{t-1} + \Pi Y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, Γ and Π are matrices of parameters, p is the number of lags selected on the basis of Akaike Information Criterion (AIC), ε_t is a (n×1) vector of error term. To detect the number of co-integrating vectors, Johansen proposed two test ratios; the maximum Eigen value test and the trace test, shown in Equations (3) and (4) respectively.

$$J_{max} = -T \ln (1- \lambda_{r+1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$J_{trace} = -T\sum_{i=r+1}^{n} \ln(1-\lambda_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

In both equations, **T** is the sample size, **n** is the number of variables, λ_i means the **i**th largest canonical correlations and **r** = 0, 1, 2, 3......... (n-1). The maximum Eigen value statistic (λ_{max}) test the null hypothesis of r cointegrating vectors against the alternative hypothesis of r+1 cointegrating vectors. On the other hand, trace statistic (λ_{trace}) investigate the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors.

3.4.6.5 Vector Error Correction Model (VECM)

If the Johansen cointegration test reveals that there is a long term relationship between the variables, the VECM can be applied in order to evaluate both the causal relationship between the variables and also to analyses the short-run properties of the cointegrated series. VECM approach focuses on the strength of interrelationships and

the speed and magnitude of reactions in one price after a price in the system is shocked (Schroeder and Goodwin, 1990). The VECM has cointegration relations built into the specification so that it restrict the long-run behavior of the endogenous variables to converge their cointegrating relationships while allowing for short-run adjustment dynamics (Engle and Granger, 1987). The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments.

A generalized Error Correction Model (ECM) for the co-integrated series is of the form

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta X_{t-i} + \varphi Z_{t-1} + \mu_t \ldots\ldots(5)$$

Where, Z_{t-1} is the error correction term and is the OLS residual from the long run co-integrating regression,

$$Y_t = \beta_0 + \beta_1 X_1 + \varepsilon_t \ldots\ldots(6)$$

The error correction term relates to the fact that last period deviation from long-run equilibrium (the error) influences the short-run dynamics of the dependent variable. The co-efficient of error correction term is the speed of adjustment; it measures the speed at which Y returns to equilibrium after a change in X. In case of no cointegration VECM is no longer required and we can directly proceed to granger causality test to establish a causal link between the variables.

3.4.6.6 Wald Test

In order to analyse the short-run causality from the independent variables to dependent variable, Wald test is employed. The Wald test computes a test statistic based on the unrestricted regression. The Wald statistic measures how close the unrestricted estimates come to satisfy the restrictions under the null hypothesis.

3.4.6.7 Residual Diagnostic Test

The goodness of the model is verified with the help of various residual tests, such as autocorrelation LM test, test of normality and heteroscedasticity test. The

autocorrelation LM test is conducted by using Breusch- Godfrey Serial Correlation LM test. Test of normality is performed to check whether the residuals are normally distributed or not. This is verified using Jarque-Bera statistic. The heteroscedasticity test is conducted by using Breusch-Pagan-Godfrey statistic in order to find out whether there is heteroscedasticity in the model or not.

3.4.7 Constraints Faced by the Farmers and Traders in the Production and Marketing of Coconut

Coconut farmers face several constraints in the production and marketing of coconut. The major limitations faced by the farmers in the production and marketing of coconut were listed out separately and then ranked based on the responses of the coconut farmers in the study area. Garret ranking technique was employed for ranking the constraints of the respondents. This method helps to identify the notable constraints affecting the farmers. Through this method, the respondents were asked to rank the identified constraints. The ranks were then converted into mean scores (Garret ranking) for capturing a real picture of the constraint prevailing in the study area. In this method, the ranks assigned to different constraints were transformed into percentage using the formula

$$\text{Per cent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij}= Rank given for i^{th} factor by j^{th} individual

N_j= Number of factors ranked by j^{th} individual

Then, the percentage positions were transformed into scores on a scale of 100 points referring to the table given by Garrett and Woodworth (1969). From the scores so obtained, the mean score level was derived and constraints were ranked based on the mean score level.

Results and Discussion

4. RESULTS AND DISCUSSION

The trade liberalisation is a gift as well as a challenge. The consequences of the trade liberalisations on agriculture, particularly in the developing countries are of many folds. The present study is a modest attempt to analyse the impact of trade liberalisation and subsequent free trade policies in edible oil on the coconut economy of India, particularly Kerala. The main objective of the study was to trace and assess the impact of trade policies in edible oil on the coconut economy of Kerala. The major findings of the study are summarized and presented in this chapter.

4.1 TRADE LIBERALISATION AND SUBSEQUENT CHANGES IN THE EDIBLE OIL SECTOR

Policies that make an economy open to trade and investment with the rest of the world are needed for sustained economic growth. In recent decades, no country has achieved economic success in terms of substantial increase in living standards for its people, without being open to the rest of the world. It is the wise decisions and timely interventions of the government that paves the way for the economic stability of a nation. Trade policies have played a key role in determining the overall level and type of India's agricultural trade for decades. Up to 1950s, India was self-sufficient in vegetable oil production. However, since 1960s, the domestic demand-supply equilibrium witnessed significant gap. India faced an acute shortage of two million tonnes of edible oil during the 1980s and it necessitated the edible oil import worth of around one billion US dollars (Babu, 2005). As a result, the Government of India had initiated a series of measures to augment the oilseed production, and the Technology Mission on Oilseeds (TMO) was started in 1986 to make oilseed production more attractive to farmers. Within a six-year period, the production of oilseed increased by over 70 per cent and India became almost self-sufficient in edible oil production. With the appropriate policy and institutional support from the government, remarkable progress was made by India in the early phase of TMO.

Prior to 1994, all the edible oil import were canalized through the State Trading Corporation (STC) subjected to state-imposed import quota. During this period, the export of oilseeds and edible oils was also banned in India, as the domestic production was not enough to feed the entire nation. At this juncture, under the World Bank Structural Adjustment Program, India started a process of phased liberalisation of edible oil from 1994-95 onwards. The liberalisation policies by the government completely reversed the situation within a decade and from a self-sufficient position, India became a net edible oil importer. Consequent to the trade liberalisation, India removed all Quantitative Restrictions (QR) on edible oil import and as per the new rules, the import is regulated by fixing suitable tariff. Consequently, India eliminated the monopoly of STC in edible oil import and placed the palmolein imports under the Open General License (OGL) system with 65 per cent basic customs duty. Later, all other edible oils were also placed under the OGL system. (Sundaramoorthy *et al*., 2014)

The important milestones in the edible oil policies from 1994 are presented in Table 4.1. For ease of understanding, the entire period is divided into three distinct phases. The first phase starts from 1994 to 1998, where a rapid lowering of import duty was observed. The duty decreased from 65 per cent in 1994 to 20 per cent in 1996 and 15 per cent in 1998. The second phase was from 1999 to 2005 and the import duties were showing an upward trend throughout the period and touched 90 per cent for refined palm oil and Refined Bleached Deodorized (RBD) palmolein in February 2005. The report of the committee on rationalization of customs and excise duties on edible oils and oilseeds was released in 2006. Based on the direction of the committee the government further lowered the import duties and subsequently the duties on all crude and refined edible oils were reduced to zero and 7.5 percent respectively in April, 2008. The very low import duty maintained during this period favored the other major producing countries of edible oil, especially Malaysia and Indonesia. The overproduction of palm oil in these countries reduced the global

market price of palm oil and India, the second largest edible oil market in the world after China became an easy dumping place. The study conducted by Jayasekhar and Thamban (2016) also complements this observation and they had recorderd that the edible oil price showed an uptrend during 2007-08. To moderate the price rise in the domestic market, Indian government drastically reduced the import duties on crude and refined edible oils and it resulted in the huge import of edible oils from other countries.

The third phase spans from 2008 to 2017, where a slight increase in the import duty could be observed. The import duty on crude edible oils was 2.5 per cent in January 2013 which increased to 7.5 per cent in December 2014 and to 12.5 per cent in September 2015. Similarly, import duty on refined edible oils increased to 10 percent in January 2014 and further to 15 percent in December 2014 and to 20 percent in September 2015. Again in June 2017, import duty on crude palm oil and refined palm oil was reduced to 7.5 per cent and 15 per cent, respectively. However, due to the steep fall in world prices of palm oil and domestic prices of oilseeds, the government increased the import duty on crude palm oil from 7.5 per cent to 15 per cent and on refined palm oil from 15 per cent to 25 per cent in August 2017. As per the WTO, India had a provision to increase the duty up to 300 per cent, but the applied tariff level was very low (Table 4.2). The low import duty in turn favored the other producing countries to dump large quantities of substituted products of domestically produced goods. Rupasena *et al.* (2007) also remarked that the extremely low import duty of edible oil granted in Sri Lanka during 1998 facilitated the large quantum of cheap edible oil import and it adversely affected the domestic coconut oil sector as a whole.

4.1.1 Free Trade Agreements (FTAs) and its Impact on Edible Oil Sector- An Overview

The FTAs are mostly bilateral agreements signed between two countries or between an individual country and a trading bloc like the Association of South East Asian Nations (ASEAN) or European Union (EU). The aim of a free trade agreement is to reduce the barriers of trade so that trade can grow as a result of specialization, division of labour and most importantly through the comparative advantage. Depending on the bargaining power of the countries involved, FTAs goes much further in liberalizing trade, services and investment than multilateral trade agreements. India has signed full-fledged FTAs (which included investment and services along with goods) with Singapore (June 2005), South Korea (August 2009) and limited FTAs (limited to goods and which are to be extended to service and investments) with Sri Lanka (2000), Thailand (2003) ASEAN (August 2009) and Japan (February 2011). The FTAs which have an influence on the domestic coconut economy are described below.

4.1.1.1 AIFTA (ASEAN- India Free Trade Area)

The AIFTA is a free trade area among the ten member states of ASEAN and India. The initial agreement was signed on 8th October 2003 in Bali, Indonesia, and the final contract signed on 13thAugust 2009. AIFTA came into effect on 1st January 2010. For India, assuredly AIFTA is the prominent Preferential Trade Agreement (PTA) initiative in its post-independence history. After India became a partner of ASEAN in 1992, its trade with ASEAN countries increased relative to its trade with the rest of the world (Sikdar and Nag, 2011). India's exports to the ASEAN region have increased from US$ 12.6 billion in 2006-07 to US$ 33 billion in 2012-13, with a compound annual growth rate of 17.4 per cent. On the other hand, India's imports from ASEAN countries have increased from US$ 18.1 billion in 2006-07 to US$ 43.4 billion in 2012-13, at a compound annual growth rate of 15.7 per cent (IBEF, 2013).

India's trade with ASEAN is mostly directed towards Singapore, Malaysia and Thailand.

In AIFTA agreement, several sensitive agricultural and manufactured products have been included under the exclusion list. The commodities enlisted in the exclusion list are not subjected to tariff reduction commitment. India’s exclusive list is fairly exhaustive embracing a wide range of sensitive and manufactured products and is the most precise arrangement for protecting the domestic industry. Even though coconut is placed under the exclusion list, the closest substitute of coconut oil, i.e., palm oil (crude and refined) is not placed in the exclusion list and is kept in a separate category referred to as special products. Apart from palm oil (crude & refined), black tea, coffee and pepper are also included in the special product list. Unlike the products in the exclusion list, the special products are subjected to tariff reduction commitment. The details are presented in Table 4.3. The inclusion of palm oil in the special product category and its phased reduction of the tariff level favoured the huge import of palm oil from the trading partners and it directly worsened the condition of coconut farmers in the southern states.

Table 4.1 Important milestones in edible oil trade policies

Period	Highlights in the edible oil trade policies (1994 to 2017)
April, 1994	Import of RBD palmolein placed on OGL with 65% import duty
February, 1995	Import of soybean oil permitted to private traders
March, 1995	Import of all edible oils (except coconut oil, palm kernel oil, RBD palm oil, RBD palm stearin) placed on OGL with 30% import duty
May, 1995	Export of sunflower, rapeseed and mustard oil permitted
1996-97	Reduction of import duty to 20% with 2% special custom duty, bringing total import duty to 22% Another special custom duty of 3% was later imposed, bringing the total import duty to 25%
July, 1998	Import duty further reduced to 15%
1999-2000	Import duty raised to 15% (basic) plus 10% (surcharge), bringing the total import duty to 16.5%
June, 2000	Import duty on crude oil raised to 25% (basic) plus 10% (surcharge), that is, 27.5%, and on refined oils raised to 35% (basic) plus 10% (surcharge) plus 4% (SAD), that is, 44.04%. Import duty on Crude Palm Oil (CPO) for manufacture of vanaspati retained at 15% (basic) plus 10% (surcharge), that is 16.5%
November, 2000	Import duty of CPO for manufacture of vanaspati rose to 25% and on crude vegetable oils raised to 35%. Import duty on CPO for manufacture, other than of vanaspati, rose to 55%. Import duty on refined vegetable oil rose to 45% (basic) plus 4% (SAD), that is, 50.8%. Import duty of refined palm oil and RBD palmolein raised to 65% (basic) plus 4% (SAD) that is 71.6%
March, 2001	Import duty on crude oils for manufacture of vanaspati or refined oil by importers registered with directorate of VVO &F raised to 75% (for others, import duty levied at 85%) except on soybean oil, rapeseed oil, and CPO, at 45%, 75% and 75% respectively. Import duty on refined oils, including RBD palmolein, rose to 85% (basic) except in the case of soya bean oil and mustard oil where it was placed at 45% (basic) and 75% (basic) respectively due to the WTO binding. In addition a 4% SAD was also levied on refined oils.
October, 2001	Import duty on CPO and its fraction of edible grade, in loose or bulk form, reduced from 75% to 65%.

Table 4.1 Continued	
Period	**Highlights in the edible oil trade policies (1994 to 2017)**
November, 2001	Import duty on crude sunflower oil or safflower oil reduced to 50%
March, 2002	Status quo on import duty structure maintained. Import of vanaspati from Nepal brought under SAD of 4%.
August, 2002	SAD made non-applicable on vanaspati imported from Nepal under Tariff Rate Quota (TRQ)
April, 2003	Import duty on refined palm oil and RBD palmolein reduced from 85% to 70% and SAD made non-applicable on edible oils.
January, 2004	SAD was abolished for all edible oils and oilseeds.
July, 2004	Import duty on refined palm oil and RBD palmolein raised from 70% to75%
February, 2005	Import duty on crude palm oil raised from 65% to 80%, and that on refined palm oil and RBD palmolein from 75% to 90%
July, 2007	The duty (basic) on refined soya oil was reduced to 40%
April, 2008	Import duties on all crude and refined edible oils were reduced to 0 % and 7.5%, respectively.
January, 2013	The ministry of finance imposed 2.5% import duty on crude edible vegetable oils. Similarly import duty of refined edible oil increased to 10%
March, 2013	The ministry of finance withdraws the exemptions from educational cess on import of soya oil as duty had been reduced to below WTO bound rate
January, 2014	Refined soybean oil- 10% (with educational cess of 3%) effective 10.3%.
December, 2014	Import duty of crude edible vegetable oil increased to 7.5 % and refined edible oil increased to 15%
September,2015	Government hiked the customs or import duty on edible oil in all categories by five per cent points, duty on crude edible oil from 7.5% to 12.5%, and on refined edible oil from 15% to 20 % to protect domestic industries.
June, 2017	Import duty on crude palm oil and refined palm oil was reduced to 7.5 % and 15%, respectively.
August, 2017	Import duty of crude palm oil increased from 7.5 % to 15 % and on refined palm oil from 15 % to 25 %.

Source: Authors compilation based on various reports of Ministry of Consumers Affairs, Food and Public Distribution

Table 4.2 Edible oil trade policies and status under WTO agreement

Item	Trade policy		Tariff level		
	Export	Import	Bound rate	Statutory duty	Currently applied rate
Coconut oil (crude)	Free	Allowed through STE	300	100	12.5
Coconut oil (others)	Free	Allowed through STE	300	100	20
Palm oil (crude)	Prohibited	Free	300	100	7.5
Palm oil (others)	Prohibited	Free	300	100	15
Soybean oil	Prohibited	Free	45	45	12.5-20
Groundnut oil	Prohibited	Free	300	100	12.5-20
Sunflower oil	Prohibited	Free	300	100	12.5-20

Source: WTO, 2017.

Table 4.3 Tariff reduction schedule of special products under AIFTA

Tariff line	Base rate	Not later than 1st January				31-12-2019
		2010	2013	2016	2019	
Crude palm oil	80	76	64	52	40	37.5
Refined palm oil	90	86	74	62	50	45
Coffee	100	95	80	65	50	45
Black tea	100	95	80	65	50	45
Pepper	70	68	62	56	51	50

Source: WTO, 2017.

4.1.1.2 Malaysia-India Comprehensive Economic Cooperation Agreement (Malaysia-India CECA)

Malaysia-India CECA came into effect on 1st July 2011 and this agreement aimed at boosting trade ties between the two countries. As a result, imports of Malaysian products such as palm oil, fruits and synthetic textiles and export of Indian products such as mangoes, basmati rice, cotton, trucks and motorcycles became duty free. Accordingly the bilateral trade between India and Malaysia reached US$ 10 billion in 2010-11 and witnessed a 26 per cent increase over the previous year. Even before the agreement, the imports from Malaysia have always been higher than its export. The gap between imports and exports

only continued to increase after the CECA. Palm oil is the main importable item from Malaysia and it acts as the main driver of trade between the two countries. About 80 per cent of India's import from Malaysia is palm oil even before the signing of the CECA. During the post-CECA, the palm oil consumption and import increased simultaneously in India due to zero tariff regimes. The share of palm oil in the total edible oil consumption has increased from a mere two per cent in 1970s to 48 per cent in 2015 (Ghosh, 2009). The agreement was observed to have mostly favoured Malaysia to dump huge quantities of cheap palm oil to the Indian market.

4.1.1.3 South Asian Free Trade Area (SAFTA)

The SAFTA agreement signed on January 6, 2004, at the 12th SAARC summit in Islamabad, Pakistan, which came into force on 1st January 2006. The purpose of SAFTA is to encourage and elevate medium and long-term contracts among the member countries. It involves agreement on tariff and non-tariff concession. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka are signatory countries of SAFTA agreement. The seven foreign ministers signed an agreement to reduce customs duties of all traded goods to zero by the year 2016. SAFTA requires that the developing countries of South Asia (India, Pakistan and Sri Lanka) bring down their duties to 20 per cent in the first phase of the two-year period ending in 2007. In the second phase of the five-year period ending in 2012, the 20 per cent duty will be reduced to zero in a series of annual cuts. The least developed nations (Nepal, Bhutan, Bangladesh, Afghanistan and Maldives) will bring down their duties to 30 per cent during the first phase and in the second phase; they have an additional three years to reduce tariffs to zero. Trade liberalisation scheme is not to be applied to the sensitive list category.

4.1.2 India's Trade Policies with WTO Member Countries *vis-a-vis* The FTAs with Other Countries

The liberalisation policy signed by India with other WTO member countries during 1990's provided a provision to increase the duty structure up to 300 per cent for all edible oil except soybean oil, for which the bound duty was fixed at 45 per cent (Table 4.2). In spite of this high bound duty, the government of India fixed low applied tariff rates for most of the edible oil and the significant reduction of tariff structure of crude and refined oils during 2008 adversely affected the oilseed sector of the country. In addition, the very low import duty on crude and refined palm oil triggered some of the South East Asian nation to dump huge quantities of cheap palm oil in the Indian market. Palm oil being the close substitute to coconut oil and its availability through fair price shop facilitated the substitution of coconut oil with palm oil among lower income households. Apart from this, restaurants and confectionery industry also began to substitute the coconut oil with low priced palm oil. This altogether created a situation in India that led to the price crash of coconut oil, which adversely affected the coconut farmers of India, especially from the southern states (Thamban *et al*., 2016). It could be observed that the free trade agreements that come up subsequently to WTO undermined the benefits that would have accrued from the bound tariff fixed in the initial WTO agreement.

4.1.3 Impact of Trade Liberalization Policies in Edible Oil on Coconut Economy of the Country

The coconut industry in the country was enjoying the privileges of a closed economy until 1995, and significant and sustainable growth in production and productivity was observed during the protected regime. Consequent to India became a signatory to the World Trade Organization (WTO), the domestic coconut market was exposed to international players. The globalization had posed multiple challenges to the future of Indian coconut industry. The opening of the domestic market for the world players and the global integration of the national

markets witnessed a paradigm shift in the domestic coconut economy. The price of coconut oil became uncompetitive due to increased trade openness and the domestic coconut industry lost the premier role played by it in the pre-liberalisation period. Frequent reduction of tariffs in the early liberalisation period furnished a provision of increased domestic access to other countries. Besides being signatory to WTO, the FTAs with neighboring countries in South Asia and South East Asia also had increased the imports of cheap coconut oil substitutes like palm oil and palm kernel oil. The high cost of domestic production favored the cheap imports of coconut and coconut products from other major producing countries and this, in turn, created concern and anxiety among the domestic farmers. However, later trade liberalization policies brought prospects to the Indian agriculture through the export of coconut and its products. The impact of liberalization policies was studied by estimating the export growth rate, export instability and comparative advantage of various coconut products.

4.1.3.1 Export Growth of Coconut Products

There was a significant improvement in the coconut export observed during the overall study period, i.e., from 1980-81 to 2016-17. The export quantity of coconut (fresh and dried) has increased from 43 tonnes in 1980-81 to 111255.8 tonnes in 2016-17 and the export earnings had increased from Rs. 0.71 lakh to Rs. 47,715.37 lakh. In desiccated coconut, the export quantity had increased from zero to 14563.26 tonnes and export value increased to Rs. 14,451.24 lakh. Similarly, in copra, the quantity of export increased from 731 tonnes to 18227.09 tonnes and the export earnings increased from Rs. 21.07 lakh to Rs. 12,977.8 lakh. Conversely, in the case of coconut oil cake, the quantity exported decreased from 2883 tonnes in 1980-81 to 34.03 tonnes in 2016-17 and the export earnings decreased from Rs. 27.99 lakh to Rs. 7.64 lakh (Fig. 4.1 to 4.5). An impressive growth in the coconut export has been observed from 2007 onwards and trade balance of coconut became positive throughout the remaining periods. The high export share of copra and coconut (fresh and dried) could be attributed to the remarkable increase in coconut exports during the period. The

adverse climatic condition in the major coconut producing countries like the Philippines, Indonesia and Sri Lanka too have contributed to the increased export share of India. The ban on export of coconut owing to rise in the domestic price by Sri Lanka added advantage for the Indian exporters to capture the market share in major importing countries like Bangladesh, Pakistan, Nepal and West Asian countries (GOI, 2012).

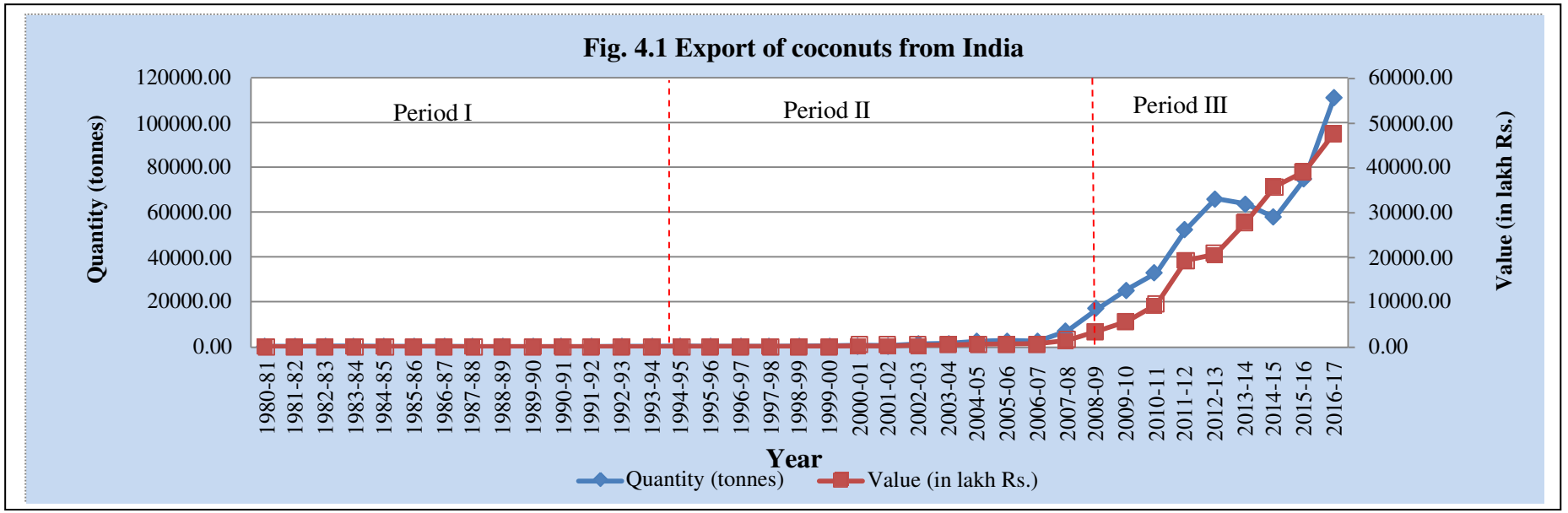


Fig. 4.1 Export of coconuts from India
Quantity (tonnes)
Value (in lakh Rs.)
Period I
Period II
Period III
120000.00
100000.00
80000.00
60000.00
40000.00
20000.00
0.00
60000.00
50000.00
40000.00
30000.00
20000.00
10000.00
0.00
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
Year
Quantity (tonnes)
Value (in lakh Rs.)

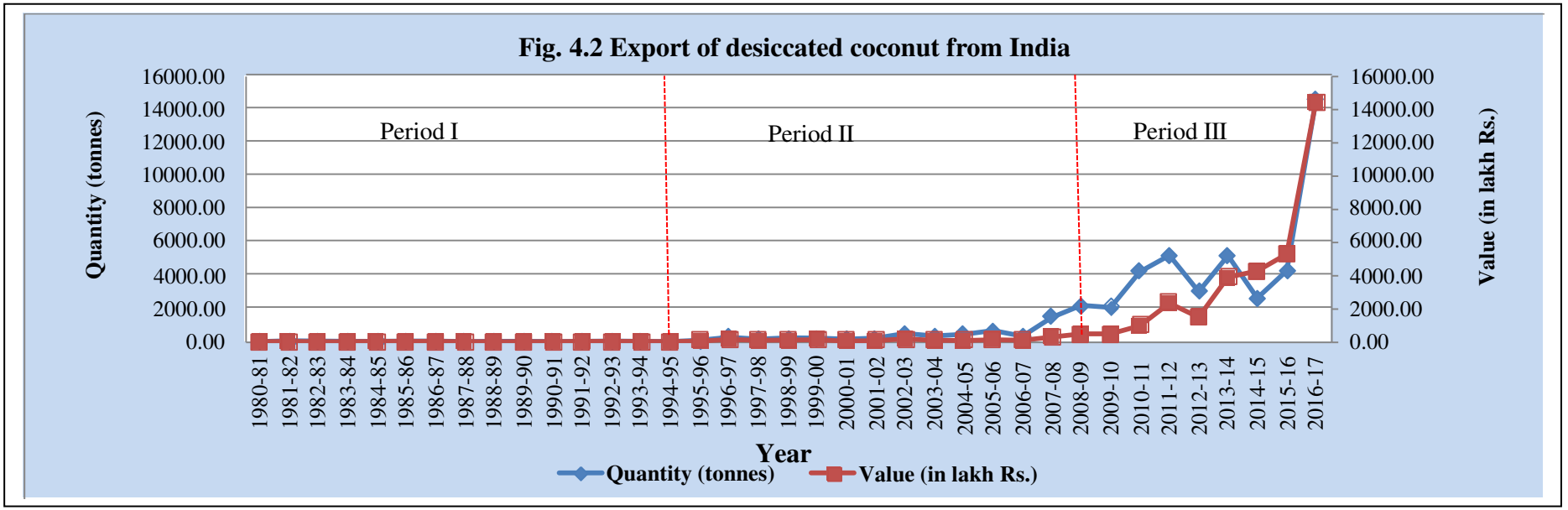


Fig. 4.2 Export of desiccated coconut from India
Quantity (tonnes)
Value (in lakh Rs.)
Period I
Period II
Period III
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
Year
Quantity (tonnes)
Value (in lakh Rs.)

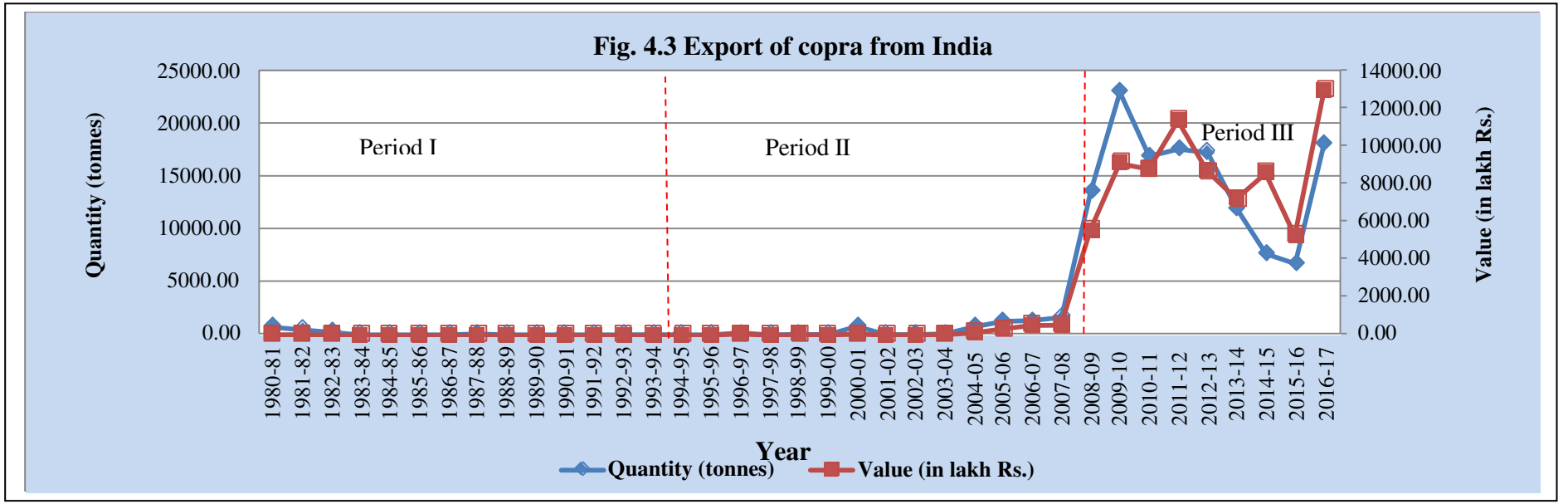


Fig. 4.3 Export of copra from India
Quantity (tonnes)
Value (in lakh Rs.)
Period I
Period II
Period III
Year
Quantity (tonnes)
Value (in lakh Rs.)

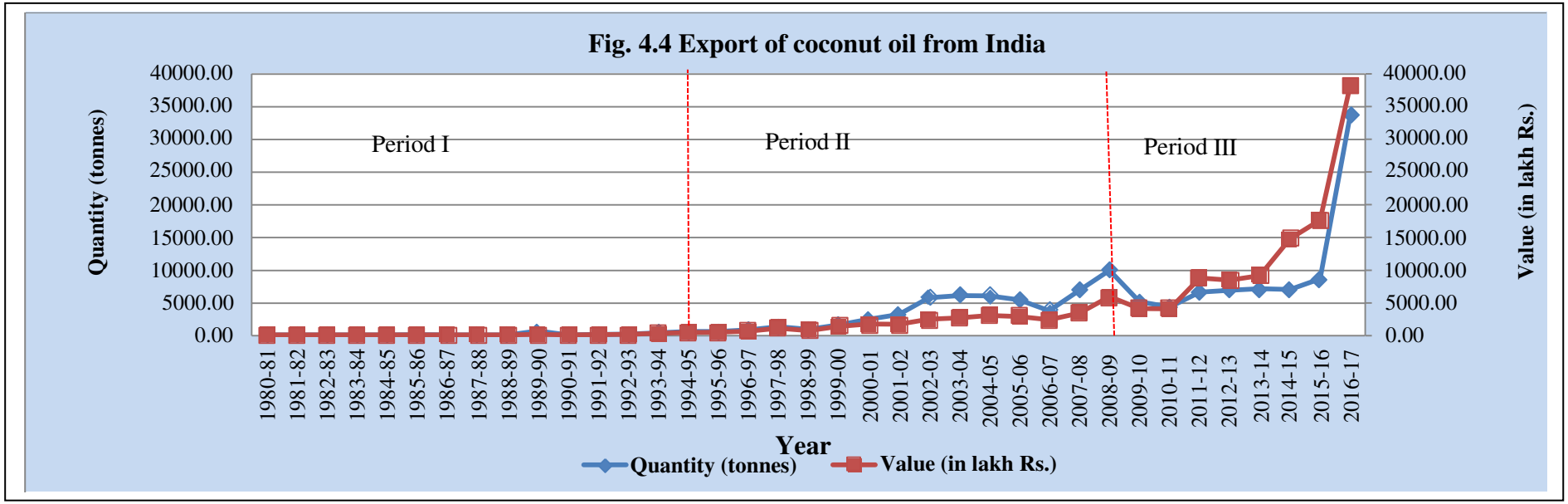


Fig. 4.4 Export of coconut oil from India
Quantity (tonnes)
Value (in lakh Rs.)
Period I
Period II
Period III
Year
Quantity (tonnes)
Value (in lakh Rs.)

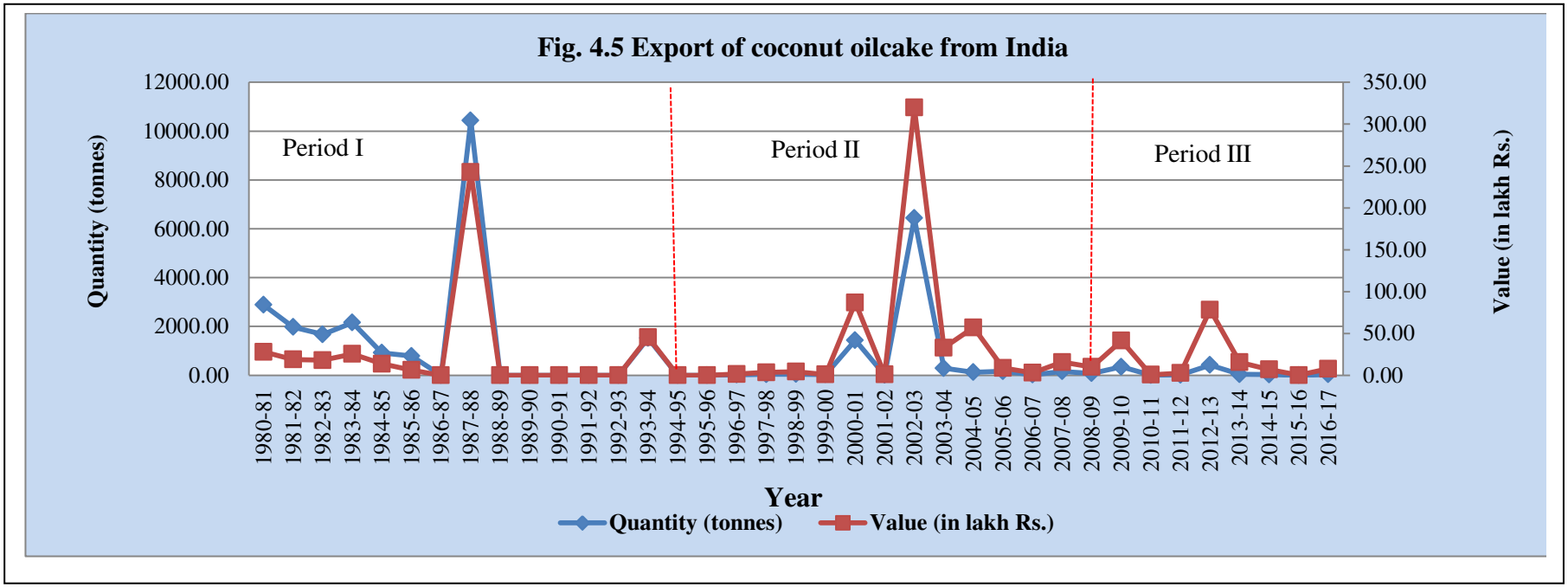


Fig. 4.5 Export of coconut oilcake from India
Quantity (tonnes)
Value (in lakh Rs.)
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Period I
Period II
Period III
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
Year
Quantity (tonnes)
Value (in lakh Rs.)

The compound growth rate of different coconut products from 1980-81 to 2016-17 is presented in Table 4.4. The overall study period was divided into three and the growth rates were computed for each sub periods. In the first period (1980-81 to 1993-94), except coconut oil, all other coconut products exhibited negative growth rates. Coconut oil exhibited a significant positive growth rate of 103.21 per cent in terms of quantity and 108.92 per cent in terms of value. The high growth rate of coconut oil does not imply that the coconut oil export during 1980s was remarkable and high, but it was solely due to the fact that the increase in coconut oil export was from a negligible quantity of 0.237 tonnes in 1980-81 to 318.07 tonnes in1993-94. In the case of copra, the export showed a significant and negative growth rate of 53.97 and 42.89 respectively, both in terms of quantity and value.

Seeds of liberalisation prospered during the second period (1994-95 to 2007-08) and the coconut industry looked hopefully towards the global market and improved its share in the international market through enhanced trade. Among the traditionally traded coconut products, copra fetched the highest significant growth rate of 56.73 per cent in terms of quantity and 65.84 per cent in terms of value. During 1994-95, the export of copra from India was very low and was about 10 tonnes, but the demand of copra from the global market increased steadily from 2004-05 and the quantity exported from India reached about 1617.46 tonnes. Export in 2007-08of copra amazingly increased during 2008-09 and touched 13578 tonnes and the export earnings reached about Rs. 5,580.70 lakh. Initially, the domestic price of copra was higher than that of international prices and copra export was found to be very meager during this period. Due to the adverse climatic conditions in major coconut producing countries, global market faces the shortage of the products during the 2008-09 periods and the limited availability of the product coupled with increased global demand raises the international price of coconut and copra (GOI, 2011). Besides, the huge import of palm oil, the closest and cheap substitute of coconut oil started influencing the price of coconut oil. At the same time, the demand for Indian

copra increased in global market and Indian dealers exported more copra to the global market in order to reap the benefit from international prices (Thasnimol and Prema, 2017). Apart from copra, other products like desiccated coconut, coconut (fresh and dried) and coconut oil also had shown positive and significant growth rates of 42.06, 39.19 and 23.49 per cent respectively, in terms of quantity and 30.46, 42.20 and 18.74 respectively, in terms of value. Despite the high growth rates, the export share of coconut and its value added products constituted less than 10 per cent of the total world exports (Sebastian, 2015). Of the total coconut oil produced in the country about 50 per cent was consumed as edible oil, 35 per cent used for toiletry and soap sector, eight per cent used in various industrial applications and the remaining seven per cent alone was exported (Jnanadevan, 2017a).

In the third period (2008-09 to 2016-17), significant export growth rates were observed only for coconut and desiccated coconut. However, the computed growth rates were found to be lower than that in the second period. The growth rates of coconut and desiccated coconut were 22.48 and 15.89 per cent respectively, in terms of quantity, and in value terms, the growth rates were 38.17 and 50.64 per cent respectively. Even if the growth rates were comparatively lower than that of the second period, the quantum of export and export earnings of coconut products increased substantially during this period. The export of coconut (fresh and dried) increased from 16608.6 tonnes in 2008-09 to 111255.8 tonnes in 2016-17. Similarly, the export of desiccated coconut increased from 2173.29 tonnes to 14563.26 tonnes. In 2009, the Government of India designated the Coconut Development Board (CDB) as the Export Promotion Council (EPC) for coconut and coconut products except coir and coir products. The action helped the Board to pay more attention to the export promotion activities and as a result the export of coconut products has been registering significant growth since 2009-10. Jayasekhar *et al.* (2019) also had opined in similar line that India was a small player in the export market of coconut products during 1980s and 1990s, but India's export sector has become vibrant with a very high growth rate of coconut

products since the upgradation of Coconut Development Board (CDB) to the status of Export Promotion Council (EPC). Even though the growth rate of coconut oil in terms of quantity was positive, it was not found to be significant, while the growth rate in value terms showed a significant growth rate of 27.49 per cent. This increased growth rate in value terms may be due to the hike in international coconut oil price and the price has increased from US$ 1,285 per tonne in January 2008 to US$ 1,699 per tonne in December 2016. But India could not gain much headway in coconut oil exports as the domestic price of coconut oil ruled above the international price till February 2016. Apart from that, the increased domestic demand and the increased availability of low priced substitute oils affected the export of coconut oil from India (Vasanthkumar et al., 2015). The export growth rate of copra was found to be negative registering a value of -7.17 during the period which could be attributed to the rapid and huge reduction of copra export from 2014 to 2016. However, the quantity of copra export increased from 13578 tonnes in 2008-09 to 18227 tonnes in 2016-17.

Table 4.4 Growth rate of coconut products export from India

Coconut products	Growth rate (Export quantity)				Growth rate (Export value)			
	Period I	Period II	Period III	Overall Period	Period I	Period II	Period III	Overall Period
Coconut	-37.99	39.19***	22.48***	36.62***	-20.38	42.20***	38.17***	47.58***
Desiccated coconut	-1.23	42.06***	15.89**	34.13***	14.14	30.46**	50.64***	42.88***
Copra	-53.97**	56.73***	-7.17	43.48***	-42.89**	65.84***	2.09	48.00***
Coconut oil	103.21***	23.49***	13.34	46.67***	108.92***	18.74***	27.49***	51.46***
Coconut oil cake	-66.08**	98.35	-36.11	3.29	-50.78**	82.12	-25.26	8.84

Note: **denotes significant at five per cent level, ***denotes significant at one per cent level
Period I- 1980-81 to 1993-94 , Period II- 1994-95 to 2007-08, Period III- 2008-09 to 2016-17 and Overall Period -1980-81 to 2016-17.

4.1.3.2 Export Instability of Coconut Products

The instability indices are used by policymakers to formulate appropriate export promotion and investment policies. A high instability index value discourages investment in the production and the export of the commodity. The estimated instability indices in the export of different coconut products are reported in Table 4.5. It can be observed from the table that except coconut oil cake, all other coconut products registered highest instability indices during Period I than the other two periods. In Period I, the maximum instability index in export quantity was observed in the case of coconut oil (176.20) followed by copra (172.89), coconut oil cake (141.50), coconut (115.45) and desiccated coconut (109.01). This indicated that coconut oil export from India was less stable compared to other products. It is interesting to note that the instability index of the export quantity of coconut (fresh and dried) declined to 38.98 in Period II and it further decelerated to 19.33 in period III. The instability indices of desiccated coconut and copra were found to decrease over entire period. In desiccated coconut, the instability index has declined from 109.01 in the Period I to 80.16 in Period II and it further dropped to 63.72 in period III. Similarly, in copra, the instability index declined from 172.89 in Period I to 90.96 in Period II and further to 33.28 in period III. It is rather paradoxical to note that the instability index of the coconut oil decreased substantially in period II (27.71), but the index was found to have increased in Period III (79.92). Even though the coconut oil export was very less during the 1980s, the large fluctuations in the export exhibited during the period led to the high instability index of coconut oil. During Period II, a gradual increase in the export of coconut oil was noticed and the export increased from 541.95 tonnes in 1994-95 to 6816.89 tonnes in 2007-08. Even though slight fluctuations were observed, a relatively stable growth of export observed during the period has resulted in the low value of instability index of coconut oil. Compared to the second period, a large fluctuation in the coconut oil export was noticed during the third period. A restriction in trade practice whereby the export of coconut oil was permitted only in consumer pack of five kilogram

until June 2013. After that the restriction was withdrawn by the government and as a result coconut oil export has been progressing from 2014-15 (Jnanadevan, 2017a) and this attributed to the high fluctuation and instability of coconut oil export during the period. Despite this fact, the export quantity of coconut oil increased substantially from 9854.58 tonnes in 2008-09 to 33499.49 tonnes in 2016-17. Unlike other coconut products, coconut oil cake showed highest instability index in period II (220.68) and the instability index values in the period I and period III are 141.50 and 145.72 respectively.

The low instability of coconut export observed in Period III was mainly due to the effort made by the Coconut Development Board. The interventions of CDB as Export Promotion Council (EPC) had contributed to the high stability of coconut export during the Period III which is very well reflected in the attractive export growth rate during the regime and thereafter. On being designated as EPC, the Board issues Registration-Cum Membership Certificates (RCMC) to exporters, providing benefits under various schemes and facilitates participation in international trade fairs. In addition, CDB also started disseminating important trade information to the exporters. The Board could also impress upon the Government of India and secure reliefs and concessions for boosting export of coconut products under various schemes. As a result of all the concerted efforts, the export of coconut products has registered a significant and relatively stabilized growth from 2009-10 onwards (Thasnimol and Prema, 2017). In a nut shell, the analysis revealed that the instability in coconut product export has decreased during the post-liberalisation period and the government measures during the post-liberalisation regime have favored the export sector of coconut. In contradiction to this Anoopkumar (2012) observed that the instability in the prices of plantation crop increased during post liberalisation period due to the high integration of domestic price with international prices.

Table 4.5 Instability index of coconut export from India

Coconut products	Instability index (Export quantity)				Instability index (Export value)			
	Period I	Period II	Period III	Overall Period	Period I	Period II	Period III	Overall Period
Coconut	115.4	38.98	19.33	138.21	107.6	17.50	19.05	110.12
Desiccated	109.0	80.16	63.72	139.92	104.9	67.65	33.34	136.49
Copra	172.8	90.96	33.28	133.45	155.5	101.51	30.09	116.45
Coconut oil	176.2	27.71	79.92	96.06	159.7	20.61	39.02	99.91
Coconut oil	141.5	220.6	145.7	236.67	191.5	172.50	144.2	218.31

Note: Period I- 1980-81 to 1993-94, Period II- 1994-95 to 2007-08, Period III- 2008-09 to 2016-17 and Overall Period -1980-81 to 2016-17

4.1.3.3 Comparative Advantage of Coconut Export from India

Revealed Symmetric Comparative Advantage (RSCA) measures the comparative advantage or disadvantage of a country with respect to another country or group of countries with respect to a specific commodity. The value of RSCA ranges from -1 to +1. A positive RSCA value indicates the comparative advantage the country holds in the export of the particular commodity. Table 4.6 shows that the RSCA value of all coconut products are negative throughout Period I. In Period II, the RSCA of all coconut products continued as negative until 2001 and in 2002 RSCA of coconut (fresh and dried) became positive and thereafter gradually increased over the subsequent years reaching 0.49 at the end of Period II. This indicated that among different coconut products, the export of coconut (fresh and dried) possessed a comparative advantage in the trade from 2002 onwards. The gradual improvement in the RSCA value signifies the comparative advantage of India in coconut trade. In the case of copra, the RSCA value was found to become positive from 2005 onwards, and at the end of Period II, the value stood around 0.44. The result clearly depicted that compared to other competing countries the copra export from India exhibited a comparative advantage since 2005. In all other coconut products, RSCA value was found to be negative throughout the second period.

A substantial improvement in the RSCA value of coconut products, especially coconut (fresh and dried) and copra could be observed during the Period III. A progressive improvement in the value of RSCA was observed in coconut which increased from 0.68 in 2008 to 0.88 in 2016. In copra, a large increase in the export was recorded during 2007-08 period and thereby RSCA improved remarkably from 0.44 in 2007 to 0.89 in 2008. The RSCA value more or less remained stable during the subsequent years. But in 2015, RSCA value sharply declined to 0.05 due to the scanty export of copra from India due to the cheaper availability of copra from our competitors. Later in 2016, India could regain its substantial share in copra export and is reflected in the RSCA value (0.75).

The period wise analysis of comparative advantage of India on the traditional coconut products expressed in terms of RSCA indicated that India possessed comparative advantage for coconut (fresh and dried) and copra alone. The RSCA value of desiccated coconut, coconut oil, and the coconut oil cake was found to be negative throughout the period which depicted that India does not possess any comparative advantage over the other competing countries in the export of these items, given the present level of value addition and processing facilities in the country.

Table 4.6 Comparative advantage of coconut export from India

	Year	RSCA				
		Coconut	Desiccated coconut	Copra	Coconut oil	Coconut oil cake
Period I (1980-81 to 1993-94)	1980	-0.75	-1	-0.49	-1	-0.28
	1981	-0.46	-0.96	-0.36	-1.00	-0.45
	1982	0.01	-0.98	-0.59	-1.00	-0.53
	1983	-0.39	-0.99	-1.00	-1.00	-0.42
	1984	-0.71	-0.99	-1.00	-1.00	-0.51
	1985	-0.73	-0.99	-0.99	-0.97	-0.76
	1986	-0.93	-0.98	-1.00	-0.97	-1.00
	1987	-1.00	-1.00	-0.82	-1.00	0.48
	1988	-0.97	-1.00	-1.00	-0.99	-1.00
	1989	-1.00	-0.99	-1.00	-0.80	-1.00
	1990	-1.00	-1.00	-0.99	-1.00	-1.00
	1991	-0.92	-1.00	-1.00	-0.89	-1.00
	1992	-0.91	-0.99	-1.00	-0.84	-1.00
	1993	-0.93	-0.98	-0.95	-0.65	-0.60
Period II (1994-95 to 2007-08)	1994	-0.67	-1.00	-0.97	-0.62	-1.00
	1995	-0.61	-0.79	-1.00	-0.70	-0.97
	1996	-0.66	-0.64	-0.51	-0.61	-0.99
	1997	-0.54	-0.79	-1.00	-0.49	-0.97
	1998	-0.45	-0.70	-1.00	-0.63	-0.96
	1999	-0.40	-0.76	-0.95	-0.27	-0.99
	2000	-0.10	-0.91	-0.69	-0.30	-0.39
	2001	-0.21	-0.82	-0.86	-0.16	-0.99
	2002	0.13	-0.71	-0.84	-0.06	0.15
	2003	0.24	-0.85	-0.56	-0.17	-0.70
	2004	0.36	-0.90	-0.11	-0.26	-0.06
	2005	0.22	-0.82	0.28	-0.39	-0.90
	2006	0.16	-0.90	0.48	-0.41	-0.93
	2007	0.49	-0.71	0.44	-0.42	-0.90
Period III (2008-09 to 2016-17)	2008	0.68	-0.67	0.89	-0.35	-0.90
	2009	0.73	-0.68	0.91	-0.42	-0.75
	2010	0.75	-0.52	0.88	-0.68	-0.12
	2011	0.81	-0.45	0.88	-0.60	-0.87
	2012	0.84	-0.45	0.86	-0.38	-0.93
	2013	0.85	-0.19	0.89	-0.41	-0.85
	2014	0.87	-0.39	0.75	-0.39	-0.98
	2015	0.88	-0.48	0.05	-0.32	-0.96
	2016	0.88	0.28	0.75	-0.02	-0.91

4.1.4 Impact of Trade Policies in Edible Oil on Coconut Economy of Kerala

Kerala, or Keralam, got its name from Kera (coconut) and no image of Kerala is ever complete without the swaying fronds of coconut palm. For centuries, coconut trees and coconuts have been playing a vital role in the day to day life and the economy of the state. Coconut was once regarded as equivalent to cash in Kerala's rural economy. The unique specialty of coconut economy of Kerala is with respect to its consumption pattern, wherein the major quantum of the total production is consumed within the state itself. The preference of coconut oil over other edible oils in the domestic market provided high demand and premium price to coconut oil, and farmers got reasonably better price which could sustain their livelihood in the early 90s (Vijayan and Job, 2013). Liberalisation and subsequent revisions in the tariff structure of edible oils had adversely affected the fate of the domestic coconut economy (Samarajeewa *et al*., 2002; Jafri, 2012; Thamban *et al*., 2016). Large imports of edible oil from other countries adversely affected the coconut oil prices in Kerala. In most of the coconut producing countries, the price of coconut oil decides the price of other coconut-based products (Rethinam and Idroes, 2005). The scenario in Kerala is also not much different.

4.1.4.1 Edible Oil Trade Policies and its Impact on Coconut Oil Prices in Kerala

A major limitation in studying the export performance of Kerala is the unavailability of state-wise trade data. Hence the impact is analysed by comparing the growth rates of edible oil import into India and coconut oil prices in Kerala. The trade policies with respect to edible oils at the national level are found to have its impact on the coconut oil prices of Kerala too. This fact is quite tricky where Kerala is the only state in the country which predominantly depended on coconut oil for domestic and industrial purpose. As the elasticity of substitution to cheaper oils like palm oil being very high in the hotel and confectionery industry as well as households coming under lower economic strata, the liberal import policies adopted at the national level straight away affected the demand-supply

equilibrium of the state. The dumping of soybean and palm oil by some countries also adversely affected the domestic coconut oil prices. The relatively low price of palm oil over coconut oil led to a large extent of substitution of palm oil for coconut oil (GOI, 2016). Consumption pattern of people changed and consumer started to accept edible oils other than those consumed traditionally. Low priced imported oils have benefitted the consumers, but have tended to reduce the margin of domestic oils which adversely affected the processors and oilseed farmers (Vijayan and Job, 2013). A comparative analysis was carried out to understand the relationship between edible oil imports and coconut oil prices in Kerala during the periods of significant policy changes which would give a better picture about the liberalisation impact on the coconut economy.

The import data of major edible oils in India during the period 1980-81 to 2016-17 is shown in Appendix II. A notable change was observed in edible oil import during the study period. The import of palm oil had increased from 721645 tonnes in 1980-81 to 8298753 tonnes during 2016-17. Similarly, the import of palm kernel oil increased from 707 tonnes to 51257 tonnes and import of soybean oil increased from 762058 tonnes to 3464598 tonnes.

The average annual price of coconut oil during the study period is presented in Appendix III. Even though some slight fluctuations, a gradual rise in the coconut oil price was noticed during the 1980s and the price crossed Rs. 4,000 per quintal in the domestic market in 1991-92. Later on, the price started showing a declining trend and in 1994-95, the average annual price of coconut oil reduced to Rs. 3,307 per quintal. The coconut oil price does not show much significant change during the next two years. A gradual increase in the price was observed during the subsequent years and the price crossed Rs. 5,000 per quintal in 1999. Even though this hike rendered some relief to the coconut farmers, its effect remained only for a short period and the trade liberalisation and subsequent removal of all quantitative restrictions has led to larger import of edible oils, which in turn, reduced the coconut oil price in the domestic market and thus price reduced to Rs. 3,182 in 2000-01 (Fig. 4.6).

It could be observed from Fig. 4.7 that the annual growth rate of palm oil has shown significant changes during 1993-94 to 2000-2001. Except for two years, palm oil import exhibited positive growth rates and the annual growth rate increased from -65 per cent in 1993 to 292 per cent in 1994 and 196 per cent in 1995. While in the case of coconut oil prices, the growth rates were found to be negative during most of the period and the annual growth rate decreased from 15 to -40 per cent from 1999 to 2000. A similar finding was also reported earlier by Sundaramoorthy *et al.* (2014) who observed that due to the high import dependence, domestic edible oil prices showed high correlation with the international prices and it has resulted in the volatility of the domestic prices. In this context, to protect the domestic oil industry the government gradually increased the import duty. Consequently, the duty on crude palm oil and RBD palmolein rose to 80 per cent and that on refined palm oil rose to 90 per cent in February 2005. The rescheduling of tariff structure during this period positively influenced the coconut oil price and the price of coconut oil in the domestic market increased to Rs.6,786 per quintal in 2004-05.

The government repeatedly revised the duty structure of edible oil and a drastic change in the import duty occurred during April 2008, wherein the import duties of all crude and refined edible oil were reduced to zero and 7.5 per cent respectively. This change in the policy structure again adversely affected the coconut farmers and the price started showing a declining tendency from 2005 onwards (Fig. 4.6 and 4.7). Mathew and Mathew (2007) also had made similar observations and attributed demand-supply imbalance, cheap import of vegetable oils, adulteration and introduction of Value Added Tax (VAT) to the fall in coconut oil price during that period. Even though the import duty was reduced to the maximum extent, the price of coconut oil did not fall steeply as expected. From 2008 onwards except for a few years, the coconut oil price in Kerala was showing an increasing trend and the price even touched Rs. 14,745 per quintal during 2014-15. Low domestic production in Kerala coupled with the increasing demand for coconut from other states to produce value-added products have

contributed to this rise in price. Also, the high demand for raw coconut from the industrial sector, as indicated by the positive trade balance in the coconut export, also had contributed to the price rise. Though the palm oil and palm kernel oil has been substituting the coconut oil in the household and industrial sector, the high demand of raw coconut and copra from other states stabilized the coconut oil prices in the domestic market of Kerala from 2007 onwards. Jayasekhar *et al.* (2014) also had reported that the short supply of coconut due to the declined productivity and high demand for coconut in the export and processing industry, mainly led to the steep rise in the coconut oil price in the domestic market from 2010 onwards. Later on, the steep fall in international prices of palm oil from about US$ 960 per tonne in March 2014 to US$ 652 per tonne in July 2016 has resulted in a drastic fall in coconut oil price from Rs. 16,477 per tonne in August 2014 to Rs. 8,390 per tonne in June 2016 in the country (GOI, 2016). Later on, as per the World Bank commodity markets outlook in July 2016, edible oil prices had rebounded in 1st half of 2016 and as a result the coconut oil price has increased since August 2016. The recent hike in the domestic coconut price is mainly owing to the supply factors. Even though coconut oil is placed in the exclusion list in the most of the trade agreement, there is also a provision to revise the exclusion list category every year. So, high domestic price arises due to supply factors always a matter of concern. The high domestic demand and industrial demand of coconut and coconut derived products compelled the government to import cheaper coconut products from other countries through removing coconut oil from the exclusion list category. This may adversely affect the coconut economy as a whole by severely reducing the coconut price in the domestic market.

Fig. 4.6 Edible oil imports and coconut oil price in Kerala

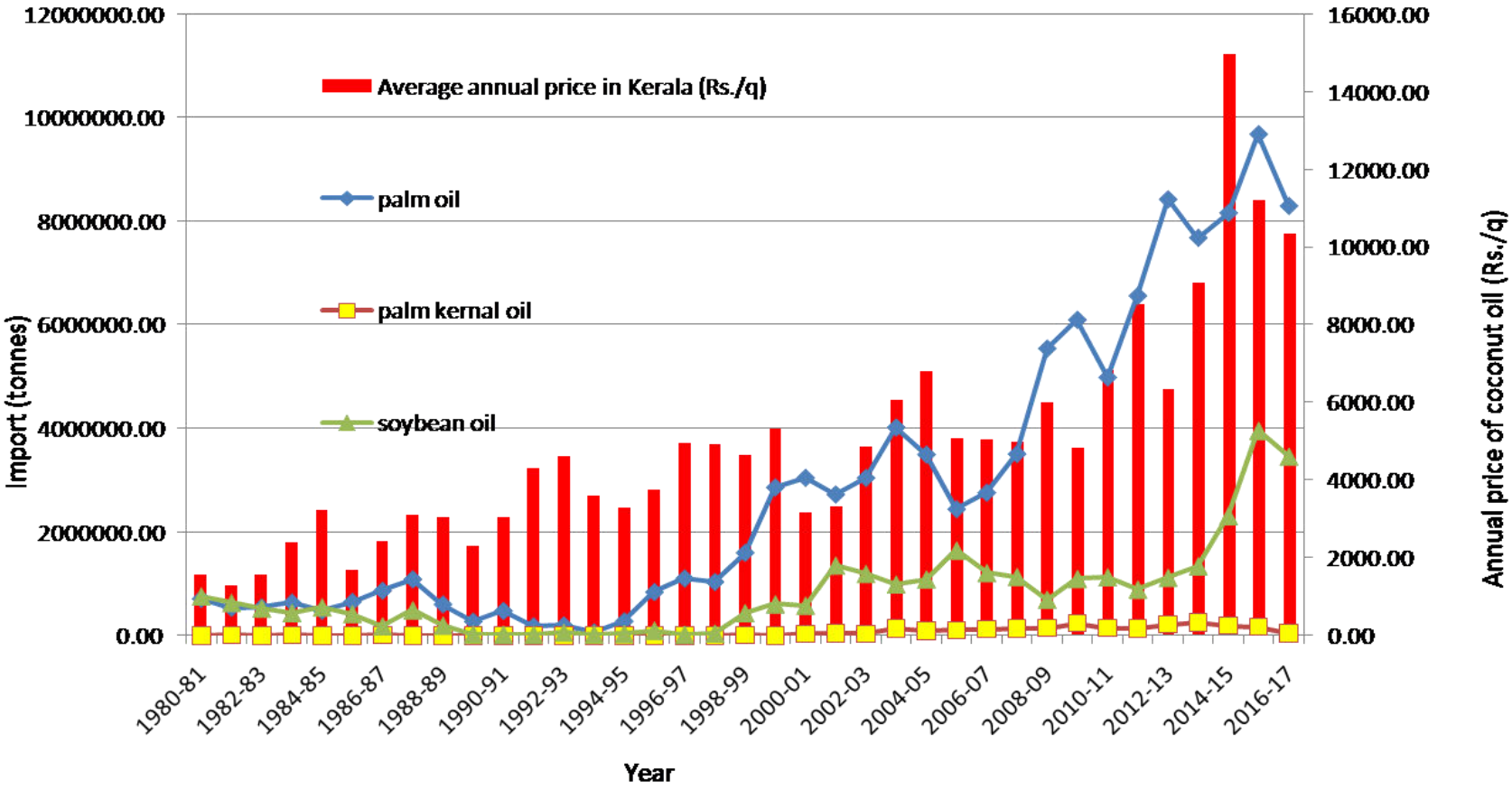
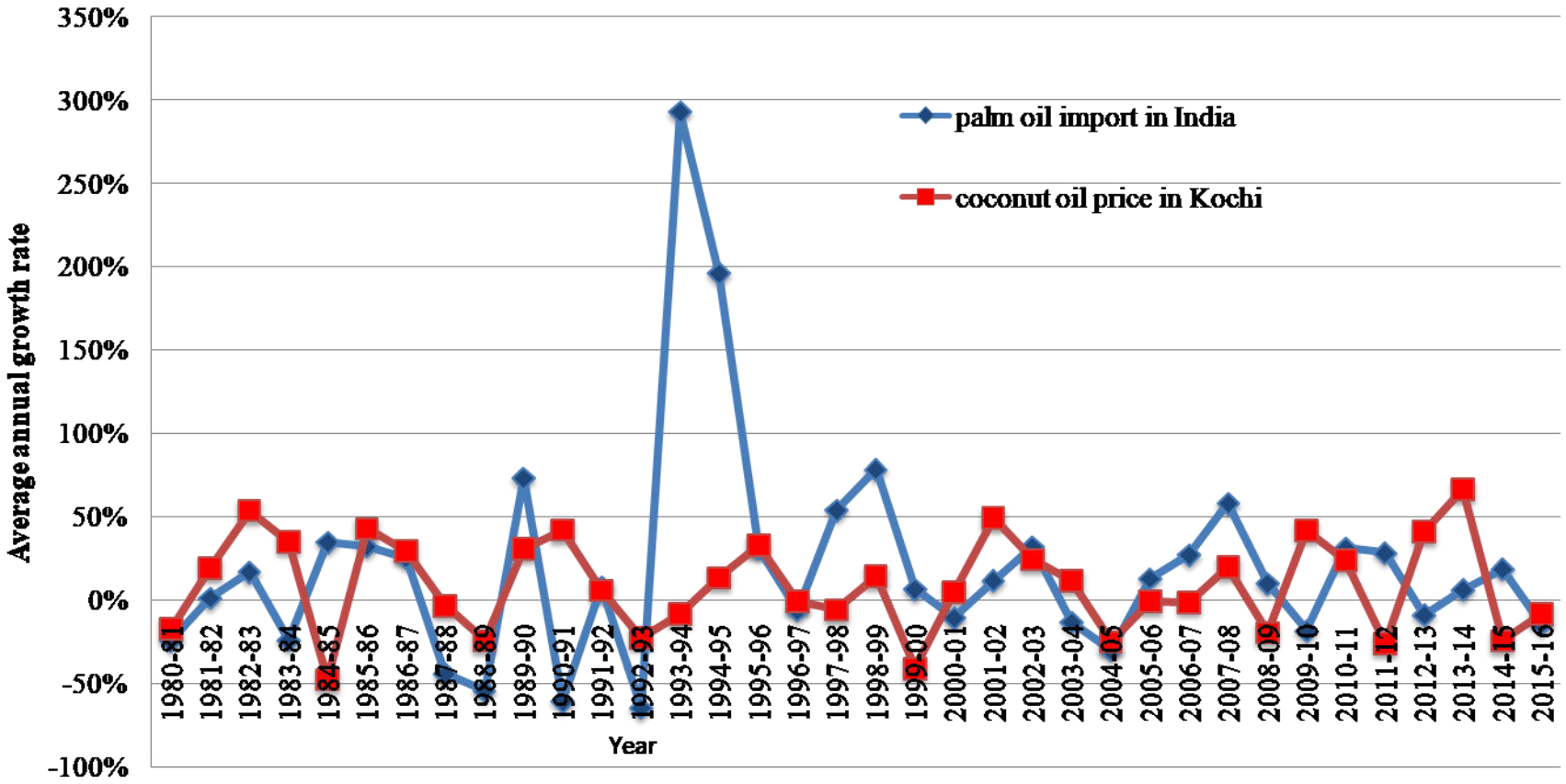


Fig. 4.7 Palm oil import *Vs*. Coconut oil price in Kerala



Exponential growth rates were estimated to compare the growth of edible oil imports and coconut oil price in Kerala. It could be observed from the Table 4.7 that, the import of palm oil, palm kernel oil and soybean oil displayed a negative growth rate of -11.33 percent, -5.7 percent and -25.29 percent respectively during the Period I. At the same time, the growth rates of coconut oil prices in the domestic markets exhibited a positive growth rate of 8.13 per cent in Kochi, 8.34 per cent in Kozhikode and 8.12 per cent in Alappuzha (Table 4.8). During Period II, the growth rates of palm oil, palm kernel oil and soybean oil import increased to 15.55, 91.35 and 35.92 per cent respectively, while the exponential growth rate of coconut oil price during this phase was only 2.84, 2.47 and 2.82 respectively in Kochi, Kozhikode and Alappuzha markets. The increased import of cheap vegetable oils in large quantities and its distribution through the Public Distribution System (PDS) could be attributed to the low growth rate of coconut oil prices during this period. In the third phase, the import growth rate of palm oil, palm kernel oil and soybean oil reduced to 7.13, -6.74 and 22.32 per cent respectively, and the coconut oil exhibited an increased growth rate of 13.27, 14.12 and 12.86 per cent respectively, in Kochi, Kozhikode and Alappuzha market. Even if the applied tariff level was very low and it facilitated the huge surge in import of edible oils, the relatively high growth rate of coconut oil prices during this period was attributed to the high industrial demand and export of coconut and coconut-derived products to the global market.

Table 4.7 Growth rates of edible oil import into India

Period	Palm oil	Palm kernel oil	Soybean oil
Period I	-11.33	-5.75	-25.29
Period II	15.55	91.35	35.92
Period III	7.13	-6.74	22.32

Note: Period I -1980-81 to 1993-94, Period II- 1994-95 to 2007-08 and Period III- 2008-09 to 2016-17

Table 4.8 Growth rates of coconut oil price in Kerala

Period	Kochi	Kozhikode	Alappuzha
Period I	8.13	8.34	8.12
Period II	2.84	2.47	2.82
Period III	13.27	14.12	12.86

Note: Period I -1980-81 to 1993-94, Period II- 1994-95 to 2007-08 and Period III-2008-09 to 2016-17

4.1.4.2 Edible Oil Trade Policies and its Impact on Consumption of Coconut Oil in Kerala

The change in the consumption pattern of coconut oil and other edible oils during the period from 1993-94 to 2011-12 is given in Table 4.9. It could be seen that the monthly per capita consumption of coconut oil in the rural areas of Kerala increased from 0.25 kg in 1993-94 to 0.45 kg in 2011-12. Compared to 1993-94, 24 per cent increase in consumption of coconut oil occurred during 1999-2000, while consumption decreased by 9.67 per cent during the subsequent period (2004-05). A similar trend was also observed in urban Kerala, where 25.92 per cent increase in consumption occurred during 1999-2000 over the previous NSSO round, while nearly six per cent decrease in the consumption was observed during the subsequent (2004-05) period. The high price of coconut oil coupled with the large influx of cheap edible oil had forced the people to use cheaper edible oils in place of coconut oil. Jayasekhar *et al.* (2013) also had remarked that a general decline in the consumption of coconut oil was noticed among the major states in India (Andra Pradesh, Karnataka, Kerala and Tamil Nadu) during 2000-01 to 2005-06. Hence, from 1993-94 to 2004-05, the consumption of other edible oil increased by 40 and 45.45 per cent respectively in rural and urban areas.. In similar lines, Meena *et al*., 2015 also observed that the inflow of low-priced imported oil reduced the demand for domestically produced edible oil which resulted in a drastic change in the consumption pattern of edible since 2000-01.

In the ensuing NSSO round (2009-10), the consumption of coconut oil increased by about 64.28 and 53.12 per cent respectively in both rural and urban areas. Even though the very low import duty of edible oil during this period favored the huge import of other edible oils, the low price of coconut oil positively influenced the consumption of coconut oil. The consumption of coconut oil again decreased during 2011-12 due to the availability of cheap substitutes in the domestic market. The market analysis indicated that edible oil policies during this period favoured the import of substitutable oils and this influx of oils adversely affected the price of domestically produced coconut oil. The price of coconut oil, in turn, influenced the consumption of coconut oil, i.e., if the coconut oil price is high, consumers will substitute other cheap edible oil with coconut oil whereas when the price is low consumers preferred to use coconut oil. Besides, the adverse propaganda on the health effects on the use of coconut oil also have played its role to the decline in consumption of coconut during this period (Jnanadevan, 2017a).

Table 4.9 Changes in the consumption pattern of coconut oil in Kerala

	NSSO round	50th	55th	61st	66th	68th
		1993-94	1999-2000	2004-05	2009-10	2011-12
Rural Kerala	Coconut oil	0.25	0.31 (24)	0.28 (-9.67)	0.46 (64.28)	0.45 (-2.17)
	Other edible oils	0.01	0.10 (900)	0.14 (40)	0.07 (-50)	0.11 (57.14)
Urban Kerala	Coconut oil	0.27	0.34 (25.92)	0.32 (-5.88)	0.49 (53.12)	0.46 (-6.12)
	Other edible oils	0.03	0.11 (266)	0.16 (45.45)	0.11 (-31.25)	0.15 (36.36)

Source: NSSO Report No.402, 457, 508, 538 and 555.
Note: Figures in the parentheses indicate per cent increase in consumption over previous round

4.1.4.3 Competitiveness and Comparative Advantage of Coconut Oil Production in Kerala

The Policy Analysis Matrix (PAM) framework developed by Monke and Pearson (1989) was used for computing the competitiveness and comparative advantage of coconut trade. The main requirement of PAM is to form an input-

output table. In PAM, the inputs are mainly divided into tradable, non-tradable, factors, and capital. Internationally traded fertilisers like urea, rock phosphate, muriate of potash, etc., were mainly included under tradable inputs. While, domestically produced manures and plant protection materials like farmyard manure, coir pith, vermicompost, neem cake, etc., were included under non-tradable inputs. Family labour, hired labour, and bullock labour were included under the factors and these are normally considered as non-tradable components. Fixed and working capitals used in the production of coconut were included under the capital section.

The input use pattern in the study area was analysed and found that the majority of the farmers were mostly using organic manures. Very few farmers were using both organic and inorganic fertilisers. Based on their preference, availability and price, the farmers used different types of organic fertilisers. Farm Yard Manure (FYM) was being used as the main source of organic manure. Apart from FYM, other organic manures usually used were coir pith compost, vermicompost, bone meal, poultry manure, goat manure, etc. The inorganic fertilisers used included urea, muriate of potash, single super phosphate, coconut mixtures and micro nutrients as the case may be. PAM analysis requires quantity-wise data on each input to find out the opportunity cost. Majority of the sample farmers used organic manures which are non-tradable commodity in the international market and hence the social cost of the component was worked out using the opportunity cost principle. The total expenditure incurred on fertilizers other than FYM is found out as the quantity equivalent of vermicompost.

In the case of plant protection chemicals, the farmers mostly used naphthalene balls and neem-based products. These are normally considered as non-tradable. In this case, the expenditure incurred on plant protection chemicals was worked out and considered as the private cost of plant protection chemicals in the PAM budget. The share of plant protection chemicals in total cost was very meager and hence the same value was used in the social price budget also. The inputs like seedlings, lime and FYM were also considered as non-tradable

component and respective social price found out using the opportunity cost principle.

In the case of factors, the farmers were mainly using human labour for all the operations except land preparation. Tractors and backhoe loader were mainly used for the preparation of the land. Even though the tractors and backhoe loaders have both tradable and non-tradable components, the study did not employ such an elaborate component-wise analysis. Moreover, here the farmers usually hired the tractor and were paying the rent that includes labour cost, fuel charges, and other expenses. The expenditure incurred on capital was included under the capital section. In addition, the interest on working capital, interest on fixed capital, annual recovery cost of irrigation pump, depreciation cost, land revenue, irrigation cost and amortised value of the establishment cost, etc., were also included under the capital section. The processing cost of coconut oil was also included under the capital section from 8^{th} year onwards. Even though the farmers were mostly selling coconut in the form of dehusked nuts, to find out the competitiveness of coconut oil from Kerala, the processing cost of coconut oil was also included in the PAM budget. The expenditure incurred in the processing of coconut oil was estimated as the average of the processing cost collected from farmers, copra makers, processors, and other intermediaries. It is also assumed that private cost and social cost for the processing of coconut remains the same.

The interest on working capital is calculated at seven per cent interest rate being the interest rate on short term crop loans charged by the commercial banks. Similarly, the interest on fixed capital is computed at 12 per cent being the interest rate of term loan charged by the commercial banks. The social discount rate displays society's relative judgment of present well-being versus well-being in the future. In a perfectly competitive world without market distortions, the market interest rate is the suitable social discount rate. In the real world where markets are distorted, the market interest rate will no longer indicate the marginal opportunity cost of public fund. The Social Opportunity Cost (SOC) approach developed by Zhuang *et al*. (2007) was adopted for computing the interest on both

working and fixed capital in the social price budget. The details of costs and returns from coconut in both private and social prices were reported in Appendix IV and V, respectively.

4.10 PAM for coconut oil production (Net Present Value, 1-50th year)

Parameters	Revenues (Rs/ha)	Cost (Rs/ha)		Profit (Rs/ha)
		Tradable input	Domestic factors	
Private prices	858728	0	780571	78158
Social prices	726680	0	1143900	-417220
Divergence	132048	0	-363329	495378

It could be observed from Table 4.10 that the coconut oil production in Kerala had shown positive private profitability of Rs. 78158. The result implied that the production of coconut oil in Kerala was competitive given the current level of technologies, prices of inputs and outputs, and policy. However, social profitability, a measure of efficiency or comparative advantage was found to be negative and indicated the lack of comparative advantage in the production and was unable to use the available resources efficiently.

The difference between the private and social cost of the domestic factor was Rs. -3,63,329. The value indicated that the social cost of the domestic factor was Rs. 11,43,900, but the farmer spent only Rs.7,80,571, i.e., a transfer of Rs. 3,63,329 was paid by the government through various policy interventions. Similarly, the difference between private and social revenue was Rs. 1,32,048, i.e., if the policy interventions were not made the farmers will get only a sum of Rs. 7,26,680, but he is receiving Rs. 8,58,728 as revenue. The output transfer of Rs. 1,32,048 has been paid by the government through various policy interventions. The net policy transfer was found to be positive and it indicated that profit at private prices (Rs.78,158) was higher than the profit at social prices (Rs.-4,17,220), i.e., the farmers received Rs. 4,95,378 through various welfare programmes. It could be inferred from the PAM analysis that, without much

government support the domestic coconut industry is not at all competitive. Even though Kerala has large area under coconut cultivation the state could not utilize the resources efficiently, which has weakened its competitiveness as a producer of coconut oil in the international market.

Table 4.11 Trade indicators derived from PAM analysis

Sl. No	Trade indicators	Coefficients
1	Nominal Protection Coefficient (NPC)	1.18
2	Effective Protection Coefficient (EPC)	1.18
3	Domestic Resource Cost (DRC)	1.57
4	Social Benefit Cost (SBC) ratio	0.64
5	Producer Subsidy Equivalent (PSE)	0.58

The NPC and EPC are generally used to find out the level of protection or the level of government intervention in different commodities. It could be observed from the Table 4.11 that the computed NPC value was 1.18 which indicated that the domestic price was more than the international price for coconut. Thus the price prevailed in the state provides a positive incentive to producers compared to free trade situations. The result further proved that the domestic producers of coconut were net subsidized. Many of the earlier studies from countries including India, had reported that the NPC value of rice was less than one, which indicated that rice production was not competitive and it was net taxed (Kanaka and Chinnadurai, 2013; Souza and Revillion, 2013; Makama *et al*., 2016). Even though NPC measures the divergence between domestic and international prices, it does not account for the discrepancies in prices of various tradable inputs in the production of these commodities (Gulati and Kelly, 1999; Varghese, 2004; Prakash, 2013). EPC, which reveals the degree of protection according to the value-added process also was found to have the same value as NPC due to the absence of a tradable input component. Although, both NPC and

EPC indicates the level of protection provided by the government to the producers through different policy interventions, the EPC is a more reliable indicator compared to NPC, as the EPC presumed free trade of input along with output (Makama, *et al*., 2016).

The Domestic resource Cost (DRC) was also more than unity (1.57) and indicated that the value of domestic resources used to produce the commodity exceeded its value-added in social prices. Production of the commodity, therefore, does not represent an efficient use of the country's scarce resources. Furthermore, the value revealed that Kerala is not an efficient producer of coconut and it lacks competitiveness in coconut export. DRC value of less than one is indicative of efficient use of resource. Though an instance of using PAM for coconut cannot be traced in literature, a study by Makama *et al*. (2016) on rice production in Karnataka state for the period 2010-2013 estimated the DRC as 0.37, indicating efficient utilization of internal resources. A good alternative for the DRC is the Social Benefit-Cost (SBC) ratio, which avoids cost classification errors in the calculation of the DRC ratio (Priyanka, *et al*., 2017) The computed SBC ratio was positive, but less than unity (0.64) which again indicated that coconut cultivation in Kerala was non-competitive and inefficient in terms of operation and resource use.

To assess the influence of all policy instruments, the Producer Subsidy Equivalent (PSE) is the best known and internationally approved method and is calculated at the farm gate level (Strokov and Meyers, 1996). The computed PSE was 0.58 which indicated that the producers were net subsidized. Moreover, the positive value of PSE is indicative that the value of transfer from consumers and taxpayers to producers resulting from a given set of agricultural policies (Priyanka *et al*., 2017).

4.2 MARKETING OF COCONUT IN KERALA

Any study on marketing is incomplete without analysing the efficiency of the existing markets for the commodity. Marketing is an economic process by

which goods and services are transacted between the producers and the consumers and their value is determined in monetary terms. Agriculture marketing encompasses all the activities concerned with the movement of produce from a farmer or producer to the ultimate consumers through various marketing channels. Improvement in the condition of farmers and their agriculture depends to a large extent on the elaborate arrangement of agricultural marketing. Thus, an efficient marketing system distributes the farmer's surplus product at a fair and reasonable price and thereby increases the income level of the producers and improves the satisfaction of the consumers.

The marketing of coconut differs from that of other fresh fruits due to its natural durability. However, lack of proper infrastructure facilities and highly fluctuating prices of coconut force the farmers to sell their produce immediately after the harvest through market mediators. The farmers who have a better financial base having infrastructure facilities and nearness to the marketing center mostly depended on the direct channel for disposing of their surplus production (GOI, 2008). The circumstances are quite different in most of the southern coconut producing tracts. The coconut producers in these areas are mostly small and marginal and they lack sufficient financial support and proper infrastructural facilities. This situation compells the farmers to sell their products through market intermediaries, but the intermediaries are harassing and deceiving the farmers differently due to the weak bargaining power of the farmers (Chinniah and Suresh, 2013). To understand the problem associated with the marketing of coconut, the present study was carried out in the three major producing districts of Kerala.

The efficiency of the coconut market was analysed through the identification of marketing channels, market functionaries, marketing cost, and marketing margins. Three coconut markets, Thiruvananthapuram representing the southern region, Thrissur representing the central region and Kozhikode from the northern region were selected. The marketing related information was also collected from the farmers and traders in the study area.

4.2.1 Marketing of Coconut in Thiruvananthapuram District

4.2.1.1 Selling Behaviour

The selling behaviour of coconut farmers in the Thiruvananthapuram district is presented in Table 4.12. It is obvious from the table that 46.66 per cent of the sample farmers marketed their produce directly to the consumers. The lack of proper management of palms and the high incidence of pest and disease has severely reduced the production and productivity of coconut in the study area. The shortage of enough nuts necessitated the import of coconut from the neighbouring states, while consumers preferred to buy the coconut produced in the state itself due to the low nut quality and health concern. There is a general perception that the coconut coming from the plantations of neighbouring state Tamil Nadu, is grown under intensive cultivation by applying large quantities of chemicals, the residue of which will be present in the nut. Hence, they preferred to buy the nuts from the neighbouring cultivators to ensure the quality of the produce. Besides, the cultivators were charged two to three rupees less than the market rate for per kg of coconut.

Table 4.12 Selling behaviour of farmer's in Thiruvananthapuram district

Sl. No.	Particulars	Proportion of farmers (n=30)
1	Consumers	46.66
2	Local traders	33.33
3	No sale (only family consumption)	20.01
	Total	100.00

About 33 per cent of the farmers relied on local traders for selling the produce. Farmers who have more acreage under coconut cultivation prefer to sell through local traders. Besides, they also carried out direct sales to the consumers. The local traders purchased the nuts from the farmers and after de-husking, it was

transported to the nearby markets or stored it in their own storehouses. Women traders frequently visit the neighbouring households and sell around 10-20 coconuts for their weekly consumption requirement. Farmers preferred cash payment over credit, hence they preferred to sell to those traders who gave the payment immediately after the sale than those who took time to settle the amount. Nearly 20 per cent of the cultivators never sell the produce in general, as it is required for their family consumption requirements. Besides, some of them also processed the coconut into coconut oil for family consumption purpose.

4.2.1.2 Marketing Channels

Marketing channels are the chain of intermediaries through which the commodity moves from the producer to the ultimate consumer. The length of the channel varies from commodity to commodity, depending upon the quantity of the commodity to be moved, perishability of the products and degree of regional specialization in production. In Thiruvananthapuram district, local traders and retailers are the main agents involved in the marketing activities of coconut. Direct marketing without the interference of any marketing intermediaries was found common in the study area. Most of the farmers in the study area were of opinion that they were getting sufficient return from coconut for sustaining their living from the palms they owned until a few years back, but the production can hardly meet their requirement at present. Presently, the production is not sufficient to meet even the family consumption purpose, remarked many respondents. Coconut, in Kerala is generally a neglected crop forming the base crop of homesteads. Most of the palms are senile with low yield, leading to improper management which leads to pest and disease attack again affecting the productivity. The cycle of low yield-improper management- lower yield render coconut cultivation unremunerative. Coupled with this, re-plantation of coconut with cash crops like rubber led to decline in production. But, this has favourably benefitted those cultivators who have surplus coconut to sell in the market. The farmers were able to sell their produce directly to consumers who were residing nearby, thus reducing their marketing costs.

In addition to direct marketing, some farmers sell portion of the produce to the local traders. Local traders are mostly traditional dealers of coconut residing in the area and they may or may not have small storehouses to keep the collected nuts. They usually purchase the husked nut from the farmers and after dehusking sell it either in the nearby market or to the retailers. Farmers mostly prefer those traders who will give the payment immediately after the sale. In the study area, mainly three types of marketing channels were identified. The details of these channels are presented in Fig. 4.8.

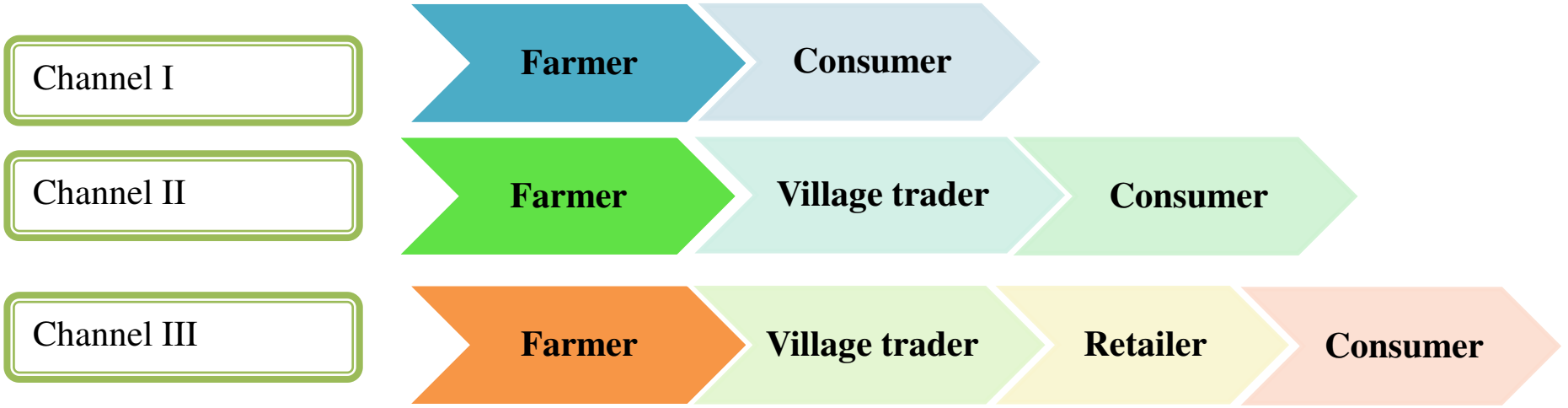


Fig. 4.8 Marketing channels of coconut in Thiruvananthapuram district

4.2.1.3 Marketing Cost and Margin

Costs involved in the marketing channels have been a matter of great concern, as the high marketing costs make the marketing system inefficient and would challenge the interests of both producers and consumers. Marketing costs consist of all the items of expenses incurred in transferring goods from the producer to the ultimate consumer. It mainly covers the expenditure incurred to perform the market functions such as transportation, storage and primary processing. These costs may vary from channel to channel through which the produce reach the consumer.

It could be observed from the Table 4.13 that marketing cost of coconut was highest in channel III (Rs. 2.95) and it accounted for about 7 per cent of the consumer price while it was lowest in the channel I (Rs 2.1) and accounted only 5.5 per cent of the consumer price. As the farmers were selling coconut directly to the consumers the marketing cost was found to be lowest in Channel I. A direct relationship between the number of marketing intermediaries and marketing cost is observed i.e., as the number of intermediaries increases marketing cost also increases. Compared to Thrissur and Kozhikode, the marketing cost of coconut was found to be very low in Thiruvananthapuram. In Thiruvananthapuram, the product mainly sold to the consumer was dehusked coconut and not coconut oil or copra. Hence the processing cost incurred was less. Moreover, comparatively lesser number of marketing intermediaries in different channels led to the low marketing cost of coconut in the area.

The marketing margin computed was highest in channel III (Rs 6.05) and it accounted for about 14.40 per cent of the consumer price. The marketing margin associated with channel II was Rs. 4.55 accounting for about 11.37 per cent of the consumer price while the marketing margin was zero in the channel I as the farmers were directly selling the produce to the final consumers without the involvement of any intermediaries (Table 4.13). Similar to the marketing cost, a direct relationship between the number of intermediaries and the marketing margin was observed.

Price spread refers to the difference between the price paid by the consumer and the price received by the farmer for an equivalent quantity of the farm produce. It includes the cost involved in moving the product from point of production to the point of consumption and the profits of various marketing functionaries associated with the movement of produce from the farmer to the final consumers. The computed price spread in various marketing channels of coconut was found to be highest in channel III and it was lowest in the channel I (Table 4.13). Price spread in channel III was estimated at Rs. 9 and it accounted for 21.42 per cent of the consumer price. The price spread associated with the channel II was Rs. 7 and it accounted for about 17.5 per cent of the consumer price. As there were no marketing mediators, the channel I had the lowest price spread (Rs 2.1). Similar to marketing cost and marketing margin, price spread also increased with an increase in the number of intermediaries. A marketing study conducted by the Department of Economics and Statistics (2009) has also made similar observation in coconut and banana. However, as the price spread increases the producer's share in consumer's rupee was found to be decreasing. When the price spread was high, the producer's share in consumer's rupee was very low (78.57%), while the producer's share in consumer's rupee was found to be the highest (94.47%) when price spread was low.

4.2.1.4 Marketing Efficiency

In the present study, marketing efficiency of various channels was computed using Shepherd's index. According to this index, marketing efficiency is the ratio of the total value of goods marketed to the sum of the total marketing costs and margins. The movement of goods from producers to consumers at the lowest possible cost consistent with the provision of services desired by the consumer may be termed as marketing efficiency. A change that reduces the cost of accomplishing a particular function without reducing consumer satisfaction indicates an improvement in the efficiency; while a change that reduces the cost which also reduces the consumer satisfaction need not indicate increase in marketing efficiency. It could be observed from the Table 4.14 that channel I had

the highest marketing efficiency of 18.09, followed by channel II (5.71) and channel III (4.66). An inverse relationship observed between marketing efficiency and price spread.

Table 4.13 Marketing cost and margin of coconut in Thiruvananthapuram district (Rs./kg)

Sl. No	Items	Channel I	Channel II	Channel III
1	Farmer's sale price	38.00	33.00	33.00
	Marketing cost	2.10	0.00	0.00
	Net price received by the Farmer	35.90	33.00	33.00
2	Village traders selling price	-	40.00	38.00
	Marketing cost	-	2.45	2.45
	Marketing margin (including the return from husk)	-	4.55	2.55
7	Retailer's sale price	-	-	42.00
	Marketing cost	-	-	0.50
	Marketing margin	-	-	3.50
8	Consumer's purchase price	38.00	40.00	42.00
	Total Marketing Cost	2.10	2.45	2.95
	Total Marketing Margin (Including the returns from by product)	0.00	4.55	6.05
	Price spread	2.10	7.00	9.00
	Producer's share in consumer's rupee	94.47	82.50	78.57

Table 4.14 Marketing efficiency of various marketing channels of coconut in Thiruvananthapuram district

Sl. No.	Channel	Marketing cost	Marketing margin	Price spread	Producer's share in	Marketing efficiency
1	Channel I	2.10	0.00	2.10	94.47	18.09
2	Channel II	2.45	4.55	7.00	82.50	5.71
3	Channel	2.95	6.05	9.00	78.57	4.66

4.2.2 Marketing of Coconut in Thrissur District

4.2.2.1 Selling Behaviour

The selling behaviour of coconut farmers in the Thrissur district is summarized in Table 4.15. It is clear from the table that 50 per cent of the farmers sell coconut in the form of dehusked nuts to the village traders. Two categories of village traders were present in the study area. Most of them were traditional traders and they may or may not have a small shop near the farmer's field. They, in turn, sell the purchased nuts to the copra makers or retailers in that area. The other category of village traders usually came from the neighbouring district or city and purchased the husked nut from the farmers. Most of the small farmers preferred these types of village traders owing to their immediate cash settlement after the transaction. In addition, they were ready to give the market price without any deductions. Later the dehusked nuts are transported largely to the Ernakulam and Moovattupuzha region and marketed to the retailers. About 27 percent of farmers sell the coconut to the copra makers. The traditional farmers who possess a good relationship with copra makers usually sell their produce to the copra makers. Even though farmers don’t get immediate cash after the sale, the good relationship with copra makers compelled the farmers to sell their product through them. About 23 per cent of coconut farmer sells the coconut in the form of dehusked nuts to the Private Coconut Producing Companies (CPCs). The recently established CPCs are now getting familiarized among the farmers. The company usually maintains good contact with the main coconut growers in the area and they purchase the nuts based on the prevailing market price. The CPC usually pays the whole amount of money immediately after the transaction, but show discrimination between the products to ensure the quality of their final product.

Table 4.15 Selling behaviour of farmer's in Thrissur district

Sl. No.	Particulars	Proportion of farmers (n=30)
1	Village traders	50.00
2	Copra makers	27.00
3	Private CPC	23.00
	Total	100.00

4.2.2.2 Marketing Channel

It could be observed that village traders, copra makers, oil millers, Coconut Producing Companies (CPCs) and retailers are the main marketing intermediaries involved in the marketing activities of coconut in the Thrissur district. The marketing of coconut through private CPCs were becoming more popular in the case of large farmers. The majority of the farmers in the study area elaborated that until a few years back they used to sell the coconut in the form of copra for making coconut oil. At present, they did not employ such primary level processing due to the scarcity of labour and high labour cost. Moreover, the relatively high price of raw coconuts, frequent price fluctuation of coconut and coconut products, adverse weather conditions and time constraints restrict the farmers to do the processing of coconut. Now the farmers sell coconut mainly in the form of dehusked nuts. Mainly four types of marketing channels were identified in the study area. The details of these channels are presented in Fig. 4.9

4.2.2.3 Marketing Cost and Margin

The cost and margin associated with different marketing channels of coconut in the Thrissur district are depicted in the Table 4.16. It is evident from the table that the marketing cost per kilogram of coconut was highest in channel II (Rs. 10), followed by channel III (Rs. 9.45), channel IV (Rs. 7.4) and channel I (Rs. 3.85). It is easily understood from the result that as the number of intermediaries increases, the marketing costs also increases. Among different channels, the marketing intermediaries are more in channel II leading to higher marketing cost

and it accounted for about 20 per cent of the consumer's purchase price. Coconut oil, the processed form of coconut, is ultimately sold to the consumers in all channels except Channel I. The high variation in marketing costs between channel I and the other channels was mainly due to the processing cost associated with those channels. Among channels II, III and IV, the marketing cost was low in the case of channel IV and it accounted for about 12 per cent of the consumer price. Even though elaborate processing is required to make superior quality coconut oil, the limited number of marketing intermediaries associated with this channel makes the marketing cost comparatively lesser. Here, the coconut producing company directly collected the nuts from the farmers and produce superior quality coconut oil and other value-added products. The produce is, in turn, sold to the nearby retail shop and it fetches a premium price over normal quality coconut oil. Apart from the local market, the produced coconut oil and other value-added products have good demand in the export market. In channel I, instead of coconut oil, the product is sold as dehusked nut to the consumers. Hence, this channel didn't incur any processing cost. Besides this fact, the less number of marketing intermediaries in the channel is one of the reasons for the low marketing cost in this channel. Here the marketing cost accounted for about 9.16 per cent of the consumer price.

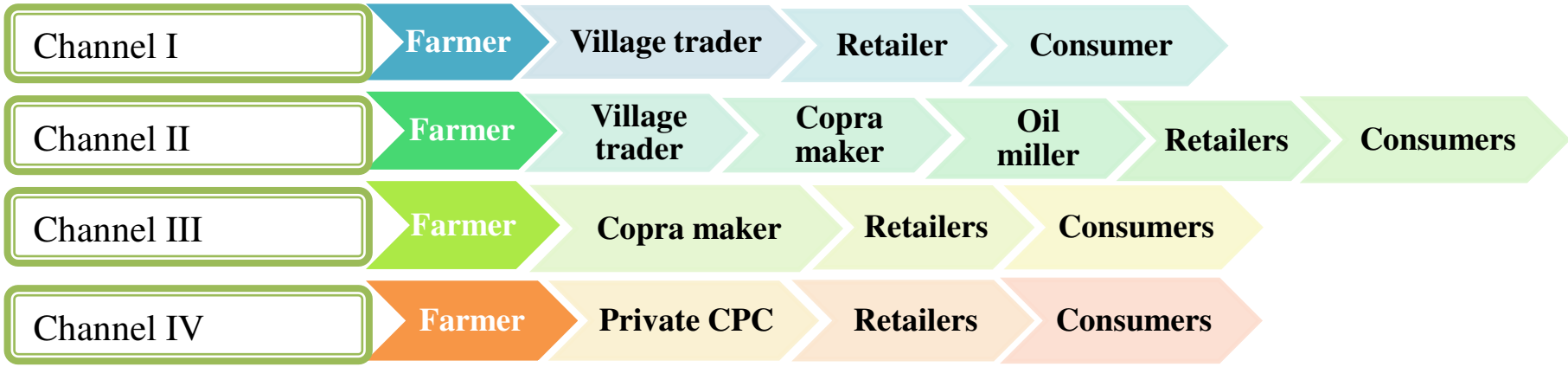


Fig. 4.9 Marketing channels of coconut in Thrissur district

The computed marketing margin was observed to be high in the channel IV (Rs. 21.48), followed by channel II (Rs. 11.38), channel III (Rs. 10.93) and channel I (Rs. 6.25). About 37 per cent of the consumer price was valued as the marketing margin in Channel IV. Even though the number of mediators was very few, optimum plant size, large scale production, use of sophisticated technology, superior quality coconut oil, etc., attributed to the high marketing margin of this channel. The lowest marketing margin was observed in the channel I due to the fewer number of marketing intermediaries. It is clear from the result that, except channel IV, as the number of intermediaries increases, the marketing margin was also found to be increasing (Table 4.16).

Between the various channels, the high price spread was found in the channel IV (Rs. 24) and it accounted for about 41.37 per cent of the consumer price, whereas it was lowest in the channel I (Rs. 8.5) and accounted for about 20.23 per cent of the consumer price. Channel II and III had the same price spread of Rs. 16.5 and it accounted for about 33 per cent of consumer prices (Table 4.16). Even though channel IV had less marketing cost compared with channel II and channel III, the high marketing margin associated with this channel chiefly contributed to the high price spread. The lowest price spread found in the channel I owing to the minimum amounts of marketing cost and margin. Due to the low marketing cost and marketing margin, the producer's share in consumer's rupee was found to be high in the channel I and was about 79.76 per cent while it was lowest in channel IV and was about 58.62 percent. The high marketing margin of private CPCs alone caused low producer's share in the consumer's rupee in channel IV. It is clear from the results that when the coconut was processed to coconut oil by the market mediators the proportional gain in terms of price was not being transferred to the producers.

Table 4.16 Marketing cost and margin of coconut in Thrissur district (Rs./kg)

Sl. No	Items	Channel I	Channel II	Channel III	Channel IV
1	Farmer's sale price	33.50	33.50	33.50	34.00
	Marketing cost	-	-	-	-
	Net price received by the Farmer	33.50	33.50	33.50	34.00
2	Village traders selling price	38.00	36.00	-	-
	Marketing cost	3.35	2.15	-	-
	Marketing margin (including the return from husk)	2.75	1.95	-	-
4	Copra makers selling price	-	42.00	42.00	-
	Marketing cost	-	3.35	4.95	-
	Marketing margin (including byproduct)	-	2.65	5.15	-
5	Oil millers selling price	-	47.00	47.00	-
	Marketing cost	-	4.00	4.00	-
	Marketing margin (including byproduct)	-	4.28	3.28	-
6	Private CPC sale price	-	-	-	54.00
	Marketing cost	-	-	-	6.90
	Marketing margin (including the byproducts)	-	-	-	17.98
7	Retailer's sale price	42.00	50.00	50.00	58.00
	Marketing cost	0.50	0.50	0.50	0.50
	Marketing margin	3.50	2.50	2.50	3.50
8	Consumer's purchase price	42.00	50.00	50.00	58.00
	Total Marketing Cost	3.85	10.00	9.45	7.40
	Total Marketing Margin (Including the returns from by product)	6.25	11.38	10.93	21.48
	Price spread	8.50	16.50	16.50	24.00
	Producer's share in consumer's rupee	79.76	67.00	67.00	58.62

4.2.2.4 Marketing Efficiency

It is evident from the Table 4.17 that channel I had the highest marketing efficiency of 4.15 while it was lowest in channel IV (2.00). The main determinant of marketing efficiency is the marketing cost and marketing margin. Marketing efficiency will be decreased with an increasing amount of marketing cost and marketing margin. Out of the four marketing channels identified in the study area, the channel I was more efficient owing to its shorter length and lower marketing cost. Even though there were less number of intermediaries observed between the farmer and consumers, the high marketing margin associated with the marketing intermediaries, i.e., private CPCs led to the low marketing efficiency of Channel IV.

Table 4.17 Marketing efficiency of various marketing channels of coconut in Thrissur district

Sl. No.	Channel	Marketing cost	Marketing margin	Price spread	Producer's share in consumer's rupee	Marketing efficiency
1	Channel	3.85	6.25	8.50	79.76	4.15
2	Channel	10.00	11.38	16.50	67.00	2.34
3	Channel	9.45	10.93	16.50	67.00	2.45
4	Channel	7.40	21.48	24.00	58.62	2.00

4.2.3 Marketing of coconut in Kozhikode district

4.2.3.1 Selling Behaviour

Table 4.18 depicted the selling behaviour of coconut farmers in the Kozhikode district. It was evident from the table that the majority of the sample farmers (57%) in the study area sold their produce in the form of dehusked nuts to the village traders. The farmers were mostly dependent on village traders as they were making immediate cash payment. Moreover, they usually provide a reasonable price for the product and did not distinguish the products based on size

and quality parameters. Traders, in turn, sold the dehusked nuts to the marketing agents from Tamil Nadu or Bangalore on the same day or within two or three days. They also sold a part of the produce to the local consumers and restaurant people for consumption purposes. Approximately 27 per cent of the sample farmers were dependent on copra makers for selling their produce. Copra makers collected the husked nut from the farmers and produce the milling copra and sold it to the millers of the Kozhikode market. In this case, copra makers frequently visit the farms of their regular customers and purchase the husked nuts from them. After the dehusking operation, they take the nuts into their copra yard. The farmers were paid after deducting the cost incurred for dehusking and transportation. Nearly 16 per cent of the farmers sell as copra to the millers of Kozhikode market.

Table 4.18 Selling behaviour of farmers in Kozhikode district

Sl. No.	Particulars	Proportion of farmers (n=30)
1	Village traders	57.00
2	Copra makers	27.00
3	Oil millers	16.00
	Total	100.00

4.2.3.2 Marketing Channels

It could be observed that village traders, marketing agents, copra makers, oil millers, wholesalers and retailers were the main marketing intermediaries associated with the marketing activities of coconut in the Kozhikode district. The coconut farmers in the study area used to sell coconut in the form of copra until a few years back. At present, the high labour cost, fluctuating nature of coconut prices and lack of proper infrastructure facilities were obstructing the farmers for doing the primary level processing. The farmers used to sell the raw nuts (husked or dehusked) immediately after the harvest instead of waiting for a long time to get higher prices. The highly fluctuating prices of coconut do not encourage the

farmers to wait further and thereby they cannot reap the advantage of time benefit. The farmers, mostly sell the dehusked nuts to the village traders who have a shop near to the farmer's coconut garden. The village traders, in turn, sell the collected coconuts to the agent of copra makers in Tamil Nadu and Bangalore on the same day or within few days. In addition, they also sell part of the coconuts to the local consumers for consumption purposes. Copra makers in the Tamil Nadu convert the raw nuts into milling copra and sell to the oil millers nearer to them. Apart from making copra, the value-added coconut products, especially coconut powder and virgin coconut oil is also produced from the coconut and these products have both domestic and export demand. The oil millers in Tamil Nadu processed the milling copra into coconut oil and sold the coconut oil to the wholesale dealers of Kerala. The existing price differences between Kozhikode and Kangayam market favoured the oil millers to get a reasonable profit from this marketing activity. Apart from that, low labour cost and advantageous of scale economies also encourages them to do the same. Four marketing channels of coconut were identified in the study area. The details of these channels are presented in Fig. 4.10.

4.2.3.3 Marketing Costs and Margins

It is evident from the Table 4.19 that the marketing cost of per kilogram coconut was highest in Channel 1 (Rs. 9.65), followed by Channel IV (Rs. 9.25), Channel II (Rs. 8.9) and Channel III (Rs. 2). Though Channel 1 is the dominant marketing channel in the study area, the highest marketing cost was seen in this channel and accounted for 18.92 per cent of the consumer price. Similarly, the marketing cost incurred for channel IV and channel II was also high and accounted for 18.13 per cent and 17.45 per cent of the consumer price. A large number of market intermediaries and high processing cost of copra and coconut oil attributed to the high cost of marketing in these channels. Even though channel I had more intermediaries, there was only a slight difference noted in the marketing cost of channel I, IV and II. In the channel I, the processing of coconut was performed in

Tamil Nadu, where the processing cost was found to be comparatively cheaper than Kerala. Owing to the direct sale of dehusked coconut from village traders to ultimate consumers, the lowest marketing cost was observed in channel III and it accounted for only 5.20 per cent of the consumer price.

Among various channels, the highest marketing margin was observed in channel II (12.80) followed by channel I (12.55), channel IV (9.4) and channel III (3.25) (Table 4.19). Copra makers and oil millers were the important market mediators in the first two channels, and their marketing margins (including the return from the by-product) were Rs. 1.54 and Rs. 4.31 respectively, in the channel I and Rs. 4.2 and Rs. 4.4 respectively, in channel II. The high marketing margin associated with these mediators was the main reason for the high marketing margins of these channels. Similar to the marketing cost, the marketing margin also found to be lowest in the channel III due to the low number of intermediaries.

In case of price spread, the highest price spread was observed in Channel I (Rs. 18.25/kg) followed by Channel II (Rs. 17/ kg), and channel IV (Rs. 15.2/kg). In channel I, II and IV, instead of raw coconut the ultimate product sold to the final consumer is coconut oil and it fetches a high price in the market. Besides, the more number of marketing intermediaries in these channels also contributes to high price spread. Conversely, in Channel III, the dehusked nut is directly sold to the consumers through the village traders and thereby exhibit low price spread. Hence, the producer's share in the consumer's rupee was found to be highest in the channel III (86.18), followed by channel IV (70.19), channel II (66.66) and channel I (64.21). From this result, it could be easily observed that the producer's share in the consumer's rupee was declining as the number of intermediaries increases. These results are in agreement with the findings of Kumar *et al.* (2011) that direct marketing of products from producer to final consumer has led to increase the producer's share in consumer's rupee.

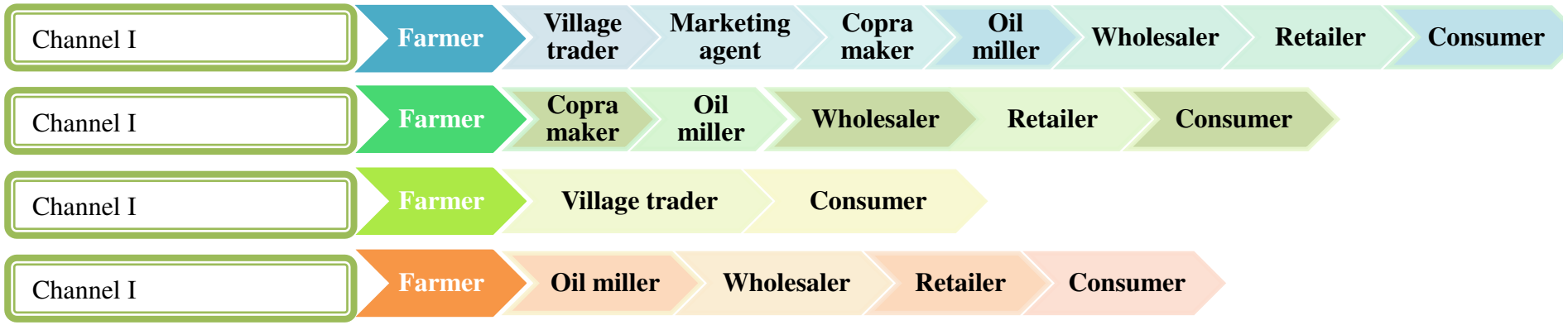


Fig. 4.10 Marketing channels of coconut in Kozhikode district

Table 4.19 Marketing cost and margin of coconut in Kozhikode district (Rs./kg)

Sl. No	Items	Channel I	Channel II	Channel III	Channel IV
1	Farmer's sale price	34.50	34.00	34.50	40.00
	Marketing cost	1.75	-	1.75	4.20
	Net price received by the Farmer	32.75	34.00	32.75	35.80
2	Village traders selling price	35.50	-	38.00	-
	Marketing cost	0.50	-	0.25	-
	Marketing margin	0.50	-	3.25	-
3	Agent's selling price	37.25	-	-	-
	Marketing cost	0.75	-	-	-
	Marketing margin	1.00	-	-	-
4	Copra makers selling price	39.64	40.80	-	-
	Marketing cost	2.10	3.85	-	-
	Marketing margin (including byproduct)	1.54	4.20	-	-
5	Oil millers selling price	44.00	45.00	-	45.00
	Marketing cost	2.75	3.25	-	3.25
	Marketing margin (including byproduct)	4.31	4.40	-	5.20
6	Wholesaler's sale price	48.00	48.00	-	48.00
	Marketing cost	1.55	1.55	-	1.55
	Marketing margin	2.45	1.45	-	1.45
7	Retailer's sale price	51.00	51.00	-	51.00
	Marketing cost	0.25	0.25	-	0.25
	Marketing margin	2.75	2.75	-	2.75
8	Consumer's purchase price	51.00	51.00	38.00	51.00
	Total Marketing Cost	9.65	8.9	2	9.25
	Total Marketing Margin (Including the returns from by	12.55	12.80	3.25	9.4
	Price spread	18.25	17.00	5.25	15.20
	Producer's share in consumer's rupee	64.21	66.66	86.18	70.19

4.2.3.4 Marketing Efficiency

Marketing efficiency indices of the identified marketing channels in the study area are presented in the Table 4.20. From the table it could be observed that the channel III had the highest marketing efficiency of 6.90, while it was lowest for Channel I (2.26). Marketing efficiency of channel II and IV were estimated to be 2.35 and 2.73 respectively. The presence of more number of intermediaries and their high marketing margins attributed to be the reason for low marketing efficiencies of the first two channels. Even though the net price received by the farmer was same in both channel 1 and channel III, the higher marketing efficiency was found in channel III owing to the less marketing cost and marketing margin associated with this channel. Despite the low marketing efficiency, the marketing of coconut through the channel 1 is dominating in the study area due to the reasonable price paid by the village traders and their immediate nature of price settlement. Compared to the channel I and channel II, the high marketing efficiency in the channel IV mainly due to the fact that the farmers were converting the coconut into copra and it fetches a good price in the market than the raw coconut. However, most of the farmers did not chose this channel due to the constraints like labour shortage, high wage rate, adverse weather condition, and risk associated with price fluctuations.

Table 4.20 Marketing efficiency of various marketing channels of coconut in Kozhikode district

Sl. No.	Channels	Marketing cost	Marketing margin	Price spread	Producer's share in consumer's rupee	Marketing efficiency
1	Channel I	9.65	12.55	16.50	64.21	2.26
2	Channel II	8.90	12.80	17.00	66.66	2.35
3	Channel III	2.00	3.25	5.25	86.18	6.90
4	Channel IV	9.25	9.40	15.20	70.19	2.73

4.3 PRICE TRANSMISSION AND MARKET INTEGRATION

4.3.1 Cointegration Analysis

The cointegration between domestic coconut oil market with international coconut oil, international groundnut oil, international palm oil and international soybean oil markets were analysed using the Maximum Likelihood Estimation (MLE) procedure (Johansen and Juselius, 1990) as it provides the most efficient estimates of the co-integrating vectors and also identifies the number of co-integrating relationship among the non-stationary variables.

Before attempting the cointegration test, the univariate time series properties of different price series were examined using the ADF unit root test. The unit root test was performed to confirm that all the price series are non-stationary at levels and integrated of the same order. The price series are transformed into a natural logarithm before testing for stationarity as well as cointegration. For the ADF test, the appropriate lag length was selected based on Akaike Information Criterion (AIC). Similarly, the suitable lag length of cointegration analysis was also identified based on AIC criterion from the estimated stable vector autoregressive model. The estimated test statistics from the ADF tests are presented in Table 4.21. It could be observed from the table that all the price series had a unit root problem at their level form. During the selected periods, the null hypothesis of the unit root at level form cannot be rejected for all the price series as the absolute value of ADF statistics were well below the five per cent critical value of the test statistics. Thus, the result of the stationarity test implied that all the price series are non-stationary at their level form. The ADF unit root test was also employed in the first difference form of the price series. The data became stationary after the first difference as the absolute value of ADF statistics was now greater than five per cent critical value of the test statistics. Hence it is clear that all the price series contained a single unit root and are integrated of order one. Having ensured the non-stationarity of the price series and identified the number of unit root present in each price series, the relationship

between edible oil markets were estimated using the Johansen- Juselius maximum likelihood procedure.

Table 4.21 Stationarity test for the edible oil price series

	Market/price series	Period I	Period II	Period III	Overall Period
		T-cal.	T-cal.	T-cal.	T-cal.
Levels	Domestic coconut oil	-2.71	-2.20	-2.03	-2.66
	International coconut oil	-2.63	-0.94	-2.77	-2.15
	International groundnut	-2.52	-1.06	-2.25	-2.48
	International palm oil	-2.47	-1.33	-2.76	-2.22
	International soybean oil	-2.02	-0.52	-2.76	-2.05
First difference	Domestic coconut oil	-5.66**	-6.93**	-3.94**	-9.11**
	International coconut oil	-8.55**	-10.07**	-4.25**	-8.21**
	International groundnut	-8.65**	-6.28**	-5.99**	-13.22**
	International palm oil	-9.46**	-4.90**	-5.25**	-8.56**
	International soybean oil	-9.68**	-4.79**	-7.49**	-9.09**

Note: ** denotes significance of values at five per cent
Period I-1980-81 to 1993-94, Period II-1994-95 to 2007-08, Period III-2008-09 to 2016-17 and Overall period- 1980-81 to 2016-17.

Johansen cointegration test was employed using the optimum lag length and the cointegration equation was identified using the maximum Eigen value test and trace test. The maximum Eigen value and trace statistic were used to deduct whether the null hypothesis is to be rejected or accepted at five per cent level of significance. The rejection of the null hypothesis, r=0 implied that there exists at least one co-integrating vector which confirms the long-run equilibrium relationship between the five selected edible oil markets.

The null hypothesis of no cointegration is accepted in the Period I (1980-1993) in both trace test and maximum Eigen test (Table 4.22). The computed trace statistic is 65.15, which is lower than the critical value at five per cent significance level. Similarly the maximum Eigen statistic, 22.94 was also lower than the critical value at five per cent level. Thus both trace test and maximum Eigen value test accepted the null hypothesis of no cointegration. During the Period II, when r=o, the trace statistic (80.41) is higher than the critical value at five per cent level (69.81) and the null hypothesis of no cointegration is rejected. While, when $r \leq 1$, the trace statistic (42.35) is lower than the critical value (47.85) at five per cent level of significance and accepted the hypothesis of at most one cointegration. The maximum Eigen value test also provided the same result. Similarly, in Period III (2008-2017), both trace test and maximum Eigen test rejected the null hypothesis of no cointegration at five per cent significance level and accepted the null hypothesis of at most one cointegration. In the overall study period (1980-2017), the null hypothesis of at most three ($r \leq 3$) cointegration is accepted at a five per cent significance level as the trace statistic (14.25) was found to be lower than the critical value at five per cent significance level.

In spite of the three co-integrating vectors in the trace statistics, the maximum Eigen value test unveiled the presence of one co-integrating vector. Except for the Period I, the existence of at least one co-integrating vectors in all other periods confirmed that there was a long-run price relationship between the selected edible oil markets. The result revealed that the liberalisation policies and further free trade agreements have resulted in the transmission of price signals in a better way between domestic and international edible oil markets and it led to the integration of these markets during the post liberalisation period. Similar findings were also observed in the price integration of edible oils (Thomas, *et al*., 2013), and plantation crops (Joseph, 2004) and observed that the markets were integrated even before liberalisation and the extent of integration accelerated in the post-reform period. A market integration study in pepper carried out by Bastine *et al.*

(2010) also made similar observations that liberalisation had improved the transmission of price signals between the domestic and the international markets and there existed a co-movement of prices.

Table 4.22 Cointegration between selected edible oil markets

Markets	H_0	Period I (1980-81 to 1993-94)		Period II (1994-95 to 2007-08)		Period III (2008-09 to 2016-17)		Overall period (1980-81 to 2016-17)	
		Trace test							
		Trace statistic	CV at 5%	Trace statistic	CV at 5%	Trace statistic	CV at 5%	Trace statistic	CV at 5%
DCO, ICO, IGO, IPO and ISO	r=0	65.15	69.81	80.41**	69.81	73.33**	69.81	96.68**	69.81
	r≤1	42.20	47.85	42.35	47.85	35.77	47.85	56.14**	47.85
	r≤2	24.23	29.79	19.43	29.79	16.49	29.79	32.13**	29.79
	r≤3	12.47	15.49	6.85	15.49	5.82	15.49	14.25	15.49
	r≤4	5.29**	3.84	0.21	3.84	0.91	3.84	3.60	3.84
DCO, ICO, IGO, IPO and ISO	H_0	Maximum Eigen Statistics							
		Max Eigen Statistic	CV at 5%	Max Eigen Statistic	CV at 5%	Max Eigen Statistic	CV at 5%	Max Eigen Statistic	CV at 5%
	r=0	22.94	33.87	38.06**	33.87	37.55**	33.87	40.53**	33.87
	r≤1	17.97	27.58	22.91	27.58	19.28	27.58	24.00	27.58
	r≤2	11.75	21.13	12.57	21.13	10.67	21.13	17.88	21.13
	r≤3	7.17	14.26	6.63	14.26	4.91	14.26	10.64	14.26
	r≤4	5.29**	3.84	0.21	3.84	0.91	3.84	3.60	3.84

Note: ** Denotes significance of values at five per cent, DCO, ICO, IGO, IPO and ISO denotes Domestic Coconut Oil, International Coconut Oil, International Groundnut Oil, International Palm oil and International Soybean Oil, respectively. CV denotes Critical Value.

4.3.2 Vector Error Correction Model (VECM)

Even though the market integration was affirmed through cointegration, there may be disequilibrium in the short run. The price adjustment across markets may not happen promptly and it may take some minimum time for the spatial price adjustments. Thus, the last step in cointegration analysis involves the application of VECM. The VECM approach mainly focused on the strength of interrelationships, and the speed and magnitude of reactions in the price of a commodity after a change in the prices of other commodities in the system (Schroeder and Goodwin, 1990). The VECM model can be applied only when there is at least one co-integrating equation among variables. As the Johansen test exposed the presence of cointegration among the variables during Period II, Period III and overall study period, the VECM model can be applied to evaluate the short-run properties of the cointegrated series. The lag length for the VECM model was selected based on the AIC from a stable VAR model.

4.3.2.1 The VECM for the Period II (1994-95 to 2007-08)

The long-run and short-run causality between the edible oil markets for the Period II was estimated using VECM and the results revealed the five models representing each of the edible oil markets as the dependent variable. Through the system equation approach, the respective probabilities of each coefficient in the model were identified. Among the five models, two models (Model I and II) with domestic coconut oil and international coconut oil as dependent variables were selected as the study intended to find the price transmission of coconut oil. The VECM for the edible oil markets during the Period II is presented in Table 4.23.

In both models, the null hypothesis of no long-run causality of independent variables on the dependent variables can be rejected only if C_1 has a negative co-efficient and is found significant. As per the VECM result, the error correction coefficient (C_1) for Model I was -0.008 and it was found to be significant at five per cent level. Thus the null hypothesis of no long-run causality is rejected and proved the existence of long-run causality running from the

international coconut oil, international groundnut oil, international palm oil and international soybean oil to domestic coconut oil market. Besides, the co-efficient of the error correction term also indicated the speed of convergence to the long-run growth path as a result of shock in their own prices and the prices of other edible oils in the system (Selvi *et al*., 2014; Kurnysheva and Burakov, 2017; Keerthiga *et al*., 2019). Thus, the error term coefficient also depicted that the long-run disequilibrium in the domestic coconut oil market got corrected within a month due to the change in its own lagged prices and prices of other edible oil in the system with an adjustment speed of 0.8 per cent. In addition, the result also revealed the existence of short-run disequilibrium. It was observed that about 30 and 23 per cent of short-run disequilibrium in the domestic coconut oil market caused by the international groundnut oil and international soybean oil market respectively was corrected within two-month lag time. In Model II, the error correction co-efficient was -0.009 and was significant at 5 per cent level. Hence, the null hypothesis of no long-run causality was rejected and confirmed the presence of long-run causality from the markets such as domestic coconut oil, international groundnut oil, international palm oil and international soybean oil to international coconut oil. Besides, it was noticed that about 14 and 32 per cent of the short-run disequilibrium in the international coconut oil market caused by the domestic coconut oil and international soybean oil market respectively, was corrected within two-months time period.

4.3.2.2 Wald Test for Short-run Causality (Period II)

To verify the short-run causality from the independent variables to the dependent variable, the Wald test was employed and the results are shown in Table 4.24. The null hypothesis of no short-run causality was examined based on F-statistic and Chi-Square statistic. In the first model, the null hypothesis of no short-run causality was accepted for all the edible oil markets like international coconut oil, international groundnut oil, international palm oil and international soybean oil. Thus, it revealed that there was no short-run causality from these

markets towards the domestic coconut oil market. By allowing coconut oil import through STC and inclusion of coconut oil under the exclusion list in most of the trade agreements, our trade policies protected the domestic coconut oil economy. Hence, very nominal import of coconut oil from other countries occurred and thus price of international oil did not influence the price of domestic coconut oil. Jayasekhar *et al*. 2019 also made similar observations and opined that the inclusion of coconut and coconut product under AIFTA provided a temporary protection for the coconut oil sector. Due to the low preference of groundnut oil and soybean oil among Keralites, the price of these oils also did not influence the price of domestic coconut oil through import policies. Even though we could not establish any short-run causal relationship from international palm oil price to domestic coconut oil price, the trade policies of palm oil and subsequent large import of palm oil definitely impacted the coconut oil sector that was already proved in Session 4.1.2. In the Model II, the null hypothesis of no short-run causality was rejected with respect to the domestic coconut oil and international soybean oil markets at five per cent significance level. Thus, it confirmed the existence of short-run causality from domestic coconut oil markets and international soybean oil markets to the international coconut oil market. From the result, it was understood that short-run price movement in other edible oils have not influenced the domestic coconut oil price while the short-run price changes in the domestic coconut oil influenced the price of international coconut oil. The findings of Murthy (2017) also supported the result and observed that whenever there was a rise in domestic coconut oil price, the international prices exerted a downward pressure to make the price

Table 4.23 VECM model for the edible oil markets during the Period II

Error Correction:	System equation co- efficients	Model I	Model II	Model III	Model IV	Model V
		D(DCO)	D(ICO)	D(IGO)	D(IPO)	D(ISO)
CointEq1	C_1	-0.008017** (0.00257)	-0.009273** (0.00245)	-0.003397** (0.00129)	-0.009393** (0.00252)	-0.002062 (0.00216)
D(DCO(-1))	C_2	0.126638 (0.07824)	0.101323 (0.07450)	-0.007946 (0.03924)	0.048113 (0.07671)	0.037117 (0.06569)
D(DCO(-2))	C_3	0.111028 (0.07854)	0.142745* (0.07478)	0.017421 (0.03939)	0.060971 (0.07700)	-0.003262 (0.06594)
D(ICO(-1))	C_4	0.059840 (0.10103)	0.127235 (0.09621)	0.047760 (0.05067)	-0.181247* (0.09906)	-0.066605 (0.08483)
D(ICO(-2))	C_5	0.108287 (0.10221)	-0.046016 (0.09733)	0.011971 (0.05126)	-0.054117 (0.10021)	0.011791 (0.08582)
D(IGO(-1))	C_6	-0.108124 (0.15945)	-0.240591 (0.15183)	0.580259** (0.07997)	-0.133904 (0.15632)	0.071051 (0.13387)
D(IGO(-2))	C_7	0.302977* (0.16470)	0.216409 (0.15684)	0.007189 (0.08261)	0.206066 (0.16148)	0.044501 (0.13829)
D(IPO(-1))	C_8	-0.051249 (0.11918)	0.053158 (0.11349)	-0.050964 (0.05978)	0.330303** (0.11685)	0.024856 (0.10007)

Table 4.23 Continued

Error Correction:	System equation co- efficients	Model I	Model II	Model III	Model IV	Model V
		D(DCO)	D(ICO)	D(IGO)	D(IPO)	D(ISO)
D(ISO(-1))	C_{10}	-0.037227 (0.13516)	-0.007749 (0.12870)	-0.020660 (0.06779)	0.100284 (0.13251)	0.321672** (0.11348)
D(ISO(-2))	C_{11}	-0.237750* (0.13822)	-0.328649** (0.13162)	0.010568 (0.06933)	-0.204296 (0.13552)	-0.196767 (0.11606)
C	C_{12}	0.001959 (0.00461)	0.004925 (0.00439)	0.001623 (0.00231)	0.005648 (0.00452)	0.003698 (0.00387)

Note: *, ** denotes significance of values at 10 per cent and 5 per cent, respectively. DCO, ICO, IGO, IPO and ISO denotes Domestic Coconut Oil, International Coconut Oil, International Groundnut Oil, International Palm oil and International Soybean Oil, respectively. Figures in parentheses denote the Standard Error.

Table 4.24 Short-run causality between edible oil markets using the Wald test (Period II)

Domestic Coconut Oil (DCO)			**International Coconut Oil**		
Null hypothesis	F statistics	Chi-square statistics	Null hypothesis	F statistics	Chi-square statistics
C(4)=C(5)=0	0.94	1.89	C(2)=C(3)=0	3.17	6.34
C(6)=C(7)=0	1.83	3.66	C(6)=C(7)=0	1.39	2.79
C(8)=C(9)=0	0.28	0.57	C(8)=C(9)=0	0.14	0.29
C(10)=C(11)=0	1.59	3.19	C(10)=C(11)=0	3.18	6.36

4.3.2.3 Residual Diagnostic Test (Period II)

The validity of the two models was verified using residual diagnostic tests like the Normality test, Autocorrelation LM test and Heteroscedasticity test. The test of normality is performed to assess whether the residual from each model are normally distributed or not. The result was verified using Jarque-Bera (JB) statistics. The JB statistics were 1.28 and 4.87 respectively, for the Model I and Model II and were not found to be significant at 5 per cent level. Hence the results of the test accepted the null hypothesis of the normal distribution of residuals in both the models. The autocorrelation test is employed using the Breusch- Godfrey serial correlation LM test. The computed F statistics were 1.26 and 0.34 respectively in Model I and Model II and were not found to be significant at five per cent level. Hence the test accepted the null hypothesis of no serial correlation in both the models. The heteroscedasticity test was performed using the Breusch-Pagan-Godfray test to find out whether heteroscedasticity is present in the model or not. Both model 1 and model II, the F statistics were not found to be significant at the five per cent level and hence accepted the null hypothesis of homoscedasticity (Table 4.25).

Table 4.25 Residual diagnostic test for the selected models (Period II)

Diagnostic test	Hypothesis	Model I		Model II	
		Result	Decision	Result	Decision
Normality test (Jarque –Bera)	H_0: Error term is normally distributed H_A: Error term is not normally distributed	JB Statistic: 1.283 P-value: 0.526	P- value> 0.05 H_0 is accepted and H_A is rejected	JB Statistic: 4.87 P-Value: 0.087	P-value> 0.05 H_0 is accepted and H_A is rejected
Serial Correlation test (LM)	H_0: No Serial correlation H_A: Serial correlation among residuals	F (2,151) Statistic:1.265 P-value: 0.284	P- value> 0.05 H_0 is accepted and H_A is rejected	F(2,151)Statistic: 0.340 P-Value: 0.711	P- value>0.05 H_0 is accepted and H_A is rejected
Heteroscedasticity test (Breusch-Pagan-Godfrey test)	H_0: Homoscedasticity H_A: Heteroscedasticity	F(15, 149) statistic: 1.192 P-value= 0.283	P- value> 0.05 H_0 is accepted and H_A is rejected	F(15,149) Statistic: 1.67 P-Value: 0.061	P- value >0.05 H_0 is accepted and H_A is rejected

4.3.2.4 The VECM for the Period III (2008-09 to 2016-2017)

The VECM for the Period III is presented in Table 4.26. Similar to the Period II the lag length of the VECM was selected based on AIC from the stable VAR model. Of the five models obtained from the VECM, two models with domestic coconut oil and international coconut oil as dependent variables were selected to study the price transmission of coconut oil. The respective probabilities of each coefficient in the model were identified using the system equation approach. In model I, the error correction coefficient (C_1) was -0.040 and it was found to be significant at the five per cent level. Hence, the result proved the existence of long-run causal relationship from international coconut oil, international ground nut oil, international palm oil and international soybean oil markets to domestic coconut oil market. Moreover, the value of the C_1 coefficient depicted that only four per cent of long-run disequilibrium in the domestic coconut oil market got corrected within a month due to the changes in its own lagged prices and the prices of other edible oils in the system. The lagged price of domestic coconut oil markets was also found significant and depicted that 27

per cent of short-run disequilibrium in the domestic coconut oil market caused due to the impact of its own price got corrected within one month time. At the same time, it is also observed that 26 per cent of short-run disequilibrium in the domestic coconut oil market caused by the international groundnut oil markets was corrected within one month time. In model II, the co-efficient of the error correction term was -0.015, but it was not significant at 5 per cent level. Thus, the null hypothesis of no long-run causality was accepted and confirmed that there was no long-run causal relationship from domestic coconut oil, international groundnut oil, international palm oil and international soybean oil to international coconut oil. Moreover, all the short-run coefficients were also found to be insignificant, indicated that price changes in the independent edible oil markets did not cause any short-run disequilibrium in the international coconut oil market.

4.3.2.5 Wald test for short-run causality (Period III)

The Wald test result for the Period III is presented in Table 4.27. In Model I, the null hypothesis of no short-run causality was rejected at the five per cent level in the case of international groundnut oil and it proved the existence of short-run causality from international groundnut oil to the domestic coconut oil. However, in Model II, the null hypothesis of no short-run causality were accepted for all edible oil markets and it implied that there was no short-run causality from the independent markets such as domestic coconut oil, international groundnut oil, international palm oil and international soybean oil to the international coconut oil market.

Table 4.26 VECM model for edible oil markets during the Period III

Error Correction	System equation coefficients	D(DCO)	D(ICO)	D(IGO)	D(IPO)	D(ISO)
CointEq1	C_1	-0.040641**	-0.015437	-0.029771**	0.001014	-0.020793**
		(0.01247)	(0.01597)	(0.00825)	(0.01371)	(0.00925)
D(DCO(-1))	C_2	0.270429**	0.178899	-0.058028	0.059776	0.025335
		(0.09058)	(0.11601)	(0.05996)	(0.09959)	(0.06724)
D(ICO(-1))	C_3	0.027569	0.037126	-0.025069	-0.000885	-0.047823
		(0.10516)	(0.13468)	(0.06961)	(0.11562)	(0.07806)
D(IGO(-1))	C_4	-0.262844**	-0.098702	0.322248**	-0.162952	-0.094251
		(0.12692)	(0.16255)	(0.08401)	(0.13954)	(0.09421)
D(IPO(-1))	C_5	-0.203219	0.297814	-0.038603	0.368275**	0.114520
		(0.14515)	(0.18590)	(0.09608)	(0.15958)	(0.10774)
D(ISO(-1))	C_6	0.078525	-0.154896	0.231189*	-0.011514	0.178387
		(0.19651)	(0.25167)	(0.13007)	(0.21604)	(0.14586)
C	C_7	0.004354	-0.000522	-0.001263	-0.004249	-0.003464
		(0.00583)	(0.00747)	(0.00386)	(0.00641)	(0.00433)

Note: *, ** denotes significance of values at 10 per cent and 5 per cent, respectively.
DCO, ICO, IGO, IPO and ISO denote Domestic Coconut Oil, International Coconut Oil, International Groundnut Oil, International Palm oil and International Soybean Oil, respectively.
Figures in parentheses denote the Standard Error.

Table 4.27 Short-run causality between the edible oil markets using the Wald test (Period III)

Domestic Coconut Oil (DCO)			**International Coconut Oil (ICO)**		
Null hypothesis	F statistics	Chi-square	Null hypothesis	F statistics	Chi-square
$C_{3=}0$	0.06 (0.793)	0.06 (0.793)	$C_{2=}0$	2.37 (0.125)	2.37 (0.123)
$C_{4=}0$	4.28 (0.040)	4.28 (0.038)	$C_{4=}0$	0.368 (0.545)	0.368 (0.543)
$C_{5=}0$	1.96 (0.164)	1.96 (0.161)	$C_{5=}0$	2.56 (0.112)	2.56 (0.109)
$C_{6=}0$	0.16 (0.690)	0.16 (0.689)	$C_{6=}0$	0.378 (0.539)	0.378 (0.538)

4.3.2.6 Residual Diagnostic Test (Period III)

Jarque - Bera statistics for the normality test was 1.68 and 1.28 respectively, for the Model I and Model II and was found to be significant at five per cent level, it indicated that the residuals were normally distributed in the selected two models (Table 4.28). The computed F statistics from the Breusch-Godfray LM test did not reject the null hypothesis of no serial correlation in the residuals at five per cent significance level. Thus the result unveiled that both models are free from serial correlation. Heteroscedasticity test also accepted the null hypothesis of homoscedastisity in both the models at five per cent significance level.

Table 4.28 Residual diagnostic test for the selected models (Period III)

Diagnostic test	Hypothesis	Model I		Model II	
		Result	Decision	Result	Decision
Normality test (Jarque –Bera)	H_0 : Error term is normally distributed H_A: Error term is not normally distributed	JB Statistics: 1.68 P-Value: 0.429	P- value> 0.05 H_0 is accepted and H_A is rejected	JB Statistic: 1.28 P-Value: 0.527	P- value> 0.05 H_0 is accepted and H_A is rejected
Serial Correlation test (LM)	H_0 : No Serial correlation H_A: Serial correlation among residuals	F (1,110) statistic: 0.25 P-value: 0.620	P- value> 0.05 H_0 is accepted and H_A is rejected	F(1,110) statistic: 0.068 P-value: 0.793	P- value> 0.05 H_0 is accepted and H_A is rejected
Heteroscedasticity test (Breusch-Pagan-Godfrey test)	H_0 : Homoscedasticity H_A: Heteroscedasticity	F(10,107) statistic: 0.83 P-value: 0.599	P- value> 0.05 H_0 is accepted and H_A is rejected	F(10, 107) statistic: 1.05 P-value: 0.408	P- value> 0.05 H_0 is accepted and H_A is rejected

4.3.2.7 The VECM for the Overall Study Period (1980 -81 to 2016-17)

The VECM for the overall study period is depicted in Table 4.29. Similar to the period II and period III, the lag length of the VECM was selected based on the AIC from the stable VAR model. From the VECM results two models with domestic coconut oil and international coconut oil as dependent variable were selected. In Model I, the coefficient of the error correction term was -0.007 and was significant at five per cent level. Thus, the result proved the existence of long-run causality from the international coconut oil, international ground oil, international palm oil and international soybean oil markets to domestic coconut oil market. Moreover, the value of the C_1 coefficient depicted that only 0.7 per cent of long-run disequilibrium in the domestic coconut oil market got corrected within a month due to the changes in its own lagged prices and the prices of other edible oils in the system. Moreover, the coefficient of one month and two months lagged price of domestic coconut oil was also found to be significant at the 5 per cent level and depicted that the 17.64 and 14.34 per cent of short-run disequilibrium in the domestic coconut oil market caused due to the impact of its own price got corrected within one month and two months respectively.

The error correction term of the Model II was -0.003, but it was not significant at the five per cent level and it indicated that there was no long-run causal relationship from domestic coconut oil, international palm oil, international groundnut oil and international soybean oil market to international coconut oil market. However, the coefficient of one month lagged price of the international coconut oil market was found to be significant at the five per cent level and depicted that 19 per cent of short-run disequilibrium in the international coconut oil market caused due to the impact of its own price got corrected within one month. At the same time, it is also observed that 10.94 and 14.65 per cent of short-run disequilibrium in the international coconut oil market caused by the domestic coconut oil and international groundnut oil markets got corrected within one month. Similarly 18.98 and 23.61 per cent of short-run disequilibrium in the international coconut oil market caused by the international groundnut oil and international soybean oil was corrected within two months.

4.3.2.8 Wald Test for Short-run Causality (Overall study period)

To verify the short-run causality the Wald test was employed and results are presented in Table 4.30. The null hypothesis of no short-run causality was tested based on the F-statistics and Chi-square statistics. The null hypothesis of no short-run causality is accepted for all edible oil markets such as international coconut oil, international palm oil, international groundnut oil and international soybean oil in Model I. Thus, it affirmed the fact that there was no short-run causality running from these markets to the domestic coconut oil market. In the case of Model II, the null hypothesis of no short-run causality is rejected at five per cent significance level for the domestic coconut oil, international groundnut oil and international soybean oil market and it inferred the presence of short-run causality from these markets towards the international coconut oil market.

4.3.2.9 Residual Diagnostic Test (Overall study period)

The validity of the two models was verified with the help of residual diagnostic tests. The normality test was verified using Jarque-Bera (JB) statistic

and result of the test accepted the null hypothesis of a normal distribution of residuals in both the models. The computed test statistics of Breusch- Godfrey serial correlation LM test did not reject the null hypothesis of no serial correlation in the residual series at five per cent significance level. The heteroscedasticity test was performed using the Breusch-Pagan-Godfray test also accepted the null hypothesis of homoscedasticity (Table 4.31).

Table 4.29: VECM for the edible oil markets during the overall study period (1980-81 to 2016-17)

Error Correction:	System equation co-efficient	D(DCO)	D(ICO)	D(IGO)	D(IPO)	D(ISO)
CointEq1	C_1	-0.007065** (0.00299)	-0.003330 (0.00340)	-0.010502** (0.00232)	-0.005520* (0.00316)	0.000918 (0.00248)
D(E(-1))	C_2	0.176422** (0.04760)	0.109459** (0.05412)	-0.010225 (0.03697)	0.070056 (0.05029)	0.058833 (0.03951)
D(E(-2))	C_3	0.143445** (0.04771)	0.066658 (0.05425)	-0.019166 (0.03705)	0.072161 (0.05041)	-0.001241 (0.03960)
D(F(-1))	C_4	0.013075 (0.05425)	0.192071** (0.06168)	0.096594** (0.04213)	-0.037190 (0.05732)	0.041786 (0.04503)
D(F(-2))	C_5	0.055128 (0.05434)	0.048885 (0.06179)	0.024135 (0.04221)	0.032547 (0.05742)	0.001894 (0.04511)
D(G(-1))	C_6	-0.069172 (0.06442)	-0.146527** (0.07325)	0.409191** (0.05003)	-0.006083 (0.06807)	0.058161 (0.05347)
D(G(-2))	C_7	0.099677 (0.06401)	0.189895** (0.07278)	0.062393 (0.04971)	0.121364* (0.06763)	0.101126* (0.05313)

Table 4.29 Continued

Error Correction:	System equation co-efficient	D(DCO)	D(ICO)	D(IGO)	D(IPO)	D(ISO)
D(H(-1))	C_8	-0.068106 (0.06906)	0.125042 (0.07853)	-0.036402 (0.05364)	0.361720** (0.07297)	0.073583 (0.05733)
D(H(-2))	C_9	-0.066017 (0.06977)	-0.045365 (0.07933)	0.023208 (0.05419)	-0.111675 (0.07372)	-0.033656 (0.05792)
D(I(-1))	C_{10}	0.133508 (0.08364)	0.079334 (0.09510)	0.085811 (0.06496)	0.065675 (0.08837)	0.236428** (0.06943)
D(I(-2))	C_{11}	-0.043735 (0.08492)	-0.236108** (0.09656)	-0.153099** (0.06595)	-0.288237** (0.08973)	-0.198302** (0.07049)
C	C_{12}	0.000998 (0.00302)	0.000945 (0.00343)	0.000724 (0.00234)	-4.98E-05 (0.00319)	0.000501 (0.00250)

Note: *, ** denotes significance of values at 10 per cent and 5 per cent, respectively.
DCO, ICO, IGO, IPO and ISO denote Domestic Coconut Oil, International Coconut Oil, International Groundnut Oil, International Palm oil and International Soybean Oil, respectively. Figures in parentheses denote the Standard Error

Table 4.30 Short-run causality between edible oil markets using Wald test (Overall study period)

Domestic Coconut Oil (DCO)			International Coconut Oil (ICO)		
Null hypothesis	F statistics	Chi-square	Null hypothesis	F statistics	Chi-square
C(4)=C(5)=0	0.62	1.24	C(2)=C(3)=0	3.37	6.75
C(6)=C(7)=0	1.37	2.74	C(6)=C(7)=0	4.07	8.14
C(8)=C(9)=0	1.18	2.35	C(8)=C(9)=0	1.29	1.29
C(10)=C(11)=0	1.35	2.70	C(10)=C(11)=0	3.19	6.39

Table 4.31 Residual diagnostic test for the selected models (Overall study period)

Diagnostic test	**Hypothesis**	**Model I**		**Model II**	
		Result	**Decision**		**Decision**
Normality test (Jarque –Bera)	H_0 : Error term is normally distributed H_A: Error term is not normally distributed	JB Statistics: 2.54 P-Value: 0.431	P- value> 0.05 H_0 is accepted and H_A is rejected	JB Statistic: 2.13 P-Value: 0.512	P- value> 0.05 H_0 is accepted and H_A is rejected
Serial Correlation test (LM)	H_0 : No Serial correlation H_A: Serial correlation among residuals	F (2,439) Statistic: 1.13 P-Value: 0.322	P- value> 0.05 H_0 is accepted and H_A is rejected	F(2,439) Statistic: 2.58 P-Value: 0.086	P- value> 0.05 H_0 is accepted and H_A is rejected
Heteroscedasticity test (Breusch-Pagan-Godfrey test)	H_0 : Homoscedasticity H_A: Heteroscedasticity	F(15,437) statistic: 1.12 P-value: 0.335	P- value> 0.05 H_0 is accepted and H_A is rejected	F(15,437) Statistic: 1.73 P-Value: 0.441	P- value> 0.05 H_0 is accepted and H_A is rejected

In nutshell, the result of the cointegration established the co-movement of prices between domestic coconut oil and other international edible oils during Period II and Period III. The result further revealed that the liberalisation policies and further free trade agreements have resulted in the transmission of price signals in a better way between domestic and international edible oil markets and it led to

the integration of these markets during the post liberalisation period. The result of the VECM model depicted that changes in international prices of edible oils were observed to cause changes in the price of the domestic coconut oil market in the long-run during Period II, Period III and overall study period. The short-run coefficient from the VECM clearly depicted that short-run price movements in the international coconut oil did not influences the domestic coconut oil price while the short-run price changes in the domestic coconut oil influenced the price of international coconut oil during Period II and overall study period. The result was further confirmed through Wald test and the result revealed the presence of short-run causality from domestic coconut oil price to the international coconut oil price during the Period II and overall study period, but the result could not establish any causality running from the price of international coconut oil to the domestic coconut oil price .It is clear from the result that even though liberalisation policies by the government led to the integration of domestic coconut oil price and international prices of other edible oils in the long-run, the policies provide some sort of protection to the domestic coconut economy by restricting coconut oil import only through state trading enterprises and by placing coconut oil under the exclusion list category in most of the trade agreements. Hence, international coconut oil price did not influence the price of domestic coconut oil through import. However, significant export of coconut and coconut derived products from the domestic market consequent to the liberalization has influenced the international coconut oil price.

4.4 SUGGESTIONS TO IMPROVE THE PERFORMANCE OF COCONUT TRADE

For giving suitable suggestions for the improvement of coconut trade it is essential to understand the problems faced by the farmers and traders in the production and marketing of coconut. An analysis of the socio-economic profile of the farmers would complement the understanding of the constraints in production and marketing of coconut. Hence a brief description of the general and

socio-economic particulars of the respondent farmers is also included in the session.

4.4.1 Socio-Economic Profile of the Sample Farmers

It could be observed from the Table 4.32 that the majority of the sample farmers were in the age group of above 60 years and exactly 30 per cent of the sample farmers were in the age group of 45-60 and only five per cent farmers were in the age group of 30-45. There were no farmers in the age group of <30 years and it indicated the lack of enthusiasm among youngsters in taking farming as a profession, which is one of the major problems confronting the agricultural sector in Kerala state. The gender-wise classification revealed that 85.56 per cent of the total respondents were male and only 14.44 percent were females. This shows that there is disparity in gender among the coconut farmers. Extensive nature of coconut plantations and the laborious activities of production and marketing had contributed to be the reasons of reluctance of female farmers in coconut cultivation. In case of family size, it can be observed that above 60 per cent of the sample farmers belonged to the family size consisting of four to six members and 30 per cent farmers came under the category of less than three members and only four per cent of the farmers had more than six members in their family. Most of the farmers coming under the family size of four to six members were found utilizing the family labour to minimize cost to some extent.

Table 4.32 Socio-economic profile of sample farmer respondents

n =90

Parameter	No.of respondents	Percentage to total
Age (years)		
Less than 30	0	0
30-45	5	5.56
45-60	27	30.00
Greater than 60	58	64.44
Gender		
Male	77	85.56
Female	13	14.44
Family size (no.)		
1-3	27	30
4-6	59	65.56
More than 6	4	4.44
Experience in farming (years)		
Less than 10	14	15.56
10-30	40	44.44
More than 30	36	40.00
Area owned (ha)		
Less than 1	44	48.89
1-2	33	36.67
2-5	13	14.44
More than 5	0	0.00
Education level		
Up to Secondary	53	58.89
Pre-degree/HSC	13	14.44
Diploma	6	6.67
Graduation	18	20.00
Main occupation		
Agriculture	44	48.89
Public sector job	14	15.56
Private sector job	13	14.44
Self employed	19	21.11
Annual income (Rs.)		
Less than 1 lakh	17	18.90
1 lakh-2 lakh	39	43.33
2 lakh-5 lakh	22	24.44
More than 5 lakh	12	13.33

The distribution of the sample farmers based on their experience in farming revealed that 44.44 per cent of the farmers had 10 to 30 years experience and only 15.56 per cent of farmers were having experience less than 10 years. It is clear from the result that coconut cultivation was mainly undertaken by the experienced farmers in the study areas. This can be correlated with the age classification of farmers. Thus, it can be inferred that the younger generation is reluctant towards farming. The classification of sample respondent based on land holding pattern depicted that majority of the sample farmers (48.89) were having marginal land holding of less than one hectare and only 14.44 per cent of the farmers owned two to five hectares of land. It can be observed that majority of the farmers are small and marginal farmers. This indicated that the coconut farmers in the state are not in a position to enjoy economies of scale of large farms as observed in the neighboring state, Tamil Nadu. The educational status of sample respondents often plays a significant role in deciding the level of adopting technology. It was observed that the majority (41%) of the farmers were educated up to the secondary level. Of the remaining farmers 20 per cent were graduates, 17 per cent had education up to primary level and about 14 per cent had education up to pre-degree. The results are consistent with the literacy rate in Kerala. All the farmers were literate and a few (20%) were graduate also. This is a good indication that the educated people are also interested in farming.

The distribution of sample respondents based on their occupation depicted that 48.89 per cent of the farmers were dependent on agriculture as their main source of family income. Of the remaining farmers about 21 per cent of the farmers were self-employed, 15.56 per cent were working in the public sector and 14.44 per cent dependent on the private sector as the source of family income. In the case of annual income majority of the farmers (43%) were having annual income in the range of one to two lakh rupees and about 24 per cent were having an annual income in the range of two to five lakh rupees. Of the remaining farmers, 18.90 per cent of the farmers had an annual income of less than one lakh rupees and 13.33 per cent had annual income more than five lakh rupees

4.4.2 The Constraints Faced by the Farmers and Traders in Production and Marketing of Coconut

4.4.2.1 The Constraints Faced by the Farmers in Coconut Production

Coconut farmers face several constraints in the production and marketing of coconut. The major limitations faced by the farmers in the production and marketing of coconut were listed out separately and then ranked based on the responses of the coconut farmers in the study area. The Garret ranking technique was employed for ranking the constraints of the respondents. The constraints in the production of coconut as identified by the respondent farmers were ranked and presented in Table 4.33.The high wage rate was identified as the major constraint in coconut production with a mean score of 74.48 per cent, followed by labour shortage (74.26) and high incidence of pest and diseases (69.96). Jayasekhar *et al.*(2019) remarked that higher per unit labour charges and lack of availability of adequate skilled labourers for the harvesting of coconut has attributed to the high labour cost in Kerala that led to the high cost of cultivation of coconut in Kerala. Moreover, due to the shortage of both skilled and unskilled labourers the workers demand high wages. So farmers are reluctant to do timely management practices which in turn, led to the high incidence of pest and disease in the coconut palm. The result confirms the GOI (2011) observation that coconut cultivation in Kerala was highly susceptible to several diseases and attack by pests. Consequently, the poor management of the crop reduced the production potential of the crop. Moreover, the scarcity of labour and high wage rate reduced the number of harvests per year when compared to earlier days. Earlier the nuts were harvested at an interval of 45-60 days, but the lack of skilled labourers and high wage rates forced the farmers to reduce the number of harvests per year. Now, most of the farmers were exercising only three to four harvests per year. The study conducted by Bhalerao *et al*. (2018) in Gujarat also reported that labour shortage and high labour charges forced the farmers to ignore the timely adoption of agronomic practices and regular harvesting. Moreover, they opined that the limited adoption of management practices in small holding led to lower productivity and high cost

of production. The severity of the problems in coconut production may restrain the youth in engaging in farm-related jobs due the high risks and uncertainty associated in farming. A study conducted in Sri Lanka by Pathiraja *et al.* (2015) also validates the above result, wherein he finds that low wage rate, high educational status and poor social acceptability had contributed to the migration of workers from the agricultural sector to the non-agricultural sector.

Table 4.33: Constraints faced by the farmers in coconut production

Constraints/ Problems	**Garrett's score**	**Rank**
High wage rate	74.48	1
Labour shortage	74.26	2
High incidence of pest and diseases	69.96	3
Lack of remunerative price for the crop	56.92	4
High cost of input	56.46	5
Low quality seedlings	54.12	6
Low productivity of the palm	51.40	7
Lack of suitable mechanization	38.22	8
Lack of irrigation facilities	35.90	9
Lack of adequate finance	35.17	10
Lack of timely support from the government	34.41	11

The other constraints were lack of remunerative price with Garrett score of 56.92 followed by high input cost (56.46), low quality seedlings (54.12), low productivity of the palm (51.4), lack of suitable mechanization (38.22), lack of irrigation facilities (35.9), lack of adequate finance (35.17) and lack of timely support from the government (34.41). According to the farmers, when compared to the cost of production, the price received for the coconut was very low. Coconut as a versatile crop needs proper management practices and good nutrition to get a better yield. The high cost of inputs and high wage rates (both skilled and unskilled) remarkably increases the cost of production of coconut while no proportionate increase could be observed in case of price. Mathews (2017) also identified that low and fluctuating price of coconut was one of the major constraints in coconut production in Kerala. The unavailability of quality seedlings was also found to be the major problem faced by the farmers and they

opined that the quality of seedlings supplied even through the Krishi Bhavan was not good. Private sellers usually sell lower-quality seedlings at a very high price by convincing the farmers that they were produced from the state institutions. Thamban and Samsudeen (2015) also reported similar findings that the lack of availability of quality seedlings was the major constraint in adopting the improved varieties. Another study conducted by Jnanadevan (2015) observed that there was a huge gap between demand and production of coconut seedlings and that mainly favoured the private agencies for the production of low quality seedlings and its distributions. Low productivity of coconut palm was ranked as the 7th constraint in coconut production. A drastic change in cropping pattern of Kerala observed over the last decades to commercial crops like rubber have led to the low productivity of coconut palm. Open ended interviews conducted among the farmers revealed that the price advantage of rubber prevailed during the 2000s attracted the attention of the farmers towards rubber. The replantation of the coconut area with rubber and complete negligence of the crop, in turn, reduced the productivity of the crop. Jayasekhar *et al.* (2013) also made same observation that many farmers in Kerala are diverted from coconut farming and switched over to rubber due to the handsome price of rubber during the late 2000s. Besides, the prevalence of very old and senile palms and high incidence of pests and diseases severely reduced the productivity of the coconut in the state. Similar to these observations, GOI (2018) and Thamban and Jayasekhar (2018) also reported that dominance of old and senile plantations, shortage of quality planting materials, the incidence of disease and insect pests, poor management of the farm, etc., has decreased the productivity of the crop to a large extent. The lack of suitable mechanization was identified as the 8th constraint by the farmers. When compared to the earlier situation the use of machinery has been increasing and people preferred to use more machine power for land clearing, land preparation and pit making. Most of the farmers in the survey area suggested that if they can do the cultivation practices of coconut using machines it will reduce the cost of production significantly. Even though the Government provides some machinery like tractors and tillers to the farmers through Krishi Bhavan, it was not found helpful to the

coconut farmers. In Kerala, most of the coconut areas are found to be intercropped with crops like tapioca, banana, vegetables, etc., and hence performing intercultural operations with tractors and tillers become practically impossible. Moreover, Gopalakrishnan (2018) also reported that the size of coconut holdings falls below two hectares at the national level and in Kerala 98 per cent of holding had less than 0.2 hectare area. The predominance of small and fragmented nature of holdings also limited the farmers in adopting the machine's power extensively. Lack of irrigation facilities was another constraint faced by the coconut farmers in the study area with Garrett's score of 35.90. Even though the farmers depend majorly on the monsoon showers, they remarked that coconut palms face moisture stress from November to May and respond well to irrigation during this period. However the extend of adoption of a drip system, which is a cost effective method of irrigation was very low, even among the farmers who have more than two acreage under coconut cultivation. Jnanadevan (2017b) also reported that rain fed nature of the crop with low adoption of irrigation practices has reduced the productivity of coconut in the state.

4.4.2.2 The constraints faced by the farmers in marketing of coconut

Price fluctuation was found to be the major marketing constraints with a Garrett score of 90 (Table 4.34). The stability of the price plays a significant role in motivating the farmers to make more investment in coconut cultivation. Besides, the stabilized price regime over a long period will also enhance the confidence of coconut farmers. The analysis of coconut prices over the past three decades revealed that the price fluctuation was very high in Kerala. The frequent fluctuations in coconut prices discouraged the farmers to invest more in coconut and did not employ proper management practices and this in turn intensified the pest and disease problems in the state. High transportation cost was found to be the second major constraint affecting the marketing of coconut. To obtain a remunerative price, the farmers have to market the product directly to the consumers or to the distant wholesale markets, which incurred additional expenses on transportation, loading and unloading. Lack of local market and

cooperative societies in the nearby areas compelled the farmers to sell the nuts through marketing intermediaries. It was observed that in the study area, especially in Thrissur and Kozhikode, above 50 per cent of the farmers were marketing their produce through the village traders. These intermediaries paid very less price to the coconut farmers and even cheated the farmers by providing wrong price information. Lack of proper storage facility was the third major constraint affecting the marketing of coconut and hence the farmers were forced to sell the coconut at very low price. Most of the farmers suggested that without good storage facility they cannot store the produce by expecting high future price due to the quality deterioration of the produce. In similar lines GOI (2017) reported that the majority of the coconut farmers in the country were small and marginal farmers and they did not possess any scientific storage and processing facilities for timely conversion of coconut into copra. Hence, most of framers sell their produce as raw nuts and did not benefit from the MSP operations as it is given for copra rather than coconut.

The other constraints faced by the farmers were lack of market information, delayed payments, inefficient procurement system, pricing based on quality of coconuts, exploitation by middlemen, and absence of co-operative society. The result evolved from the qualitative research techniques like Focus Group Discussion (FGD) and Garrett's ranking techniques strongly indicate the lack of sufficient and timely market information and market intelligence in the coconut sector. The inefficient procurement system was also found as a constraint in the market. Due to the lack of drying facilities to convert fresh coconut into copra most of the farmers preferred to sell their produce as raw coconut instead of copra. So the central government copra procurement scheme through NAFED was not benefitting the coconut farmers in Kerala. To resolve this problem Kerala government started the procurement of raw or green coconut through Krishi Bhavan in January 2013 and the coconut procured under the scheme has increased from 9990 tonnes in 2014-15 to 37164 tonnes in 2016-17. However, the programme was not found successful and KERAFED has incurred heavy losses and they could not settle the payment to the farmers on correct time (GOI, 2018).

Assured remunerative and stable prices to the coconut farmers are utmost important for encouraging farmers to adopt new practices and technologies to improve production and productivity. Hence the government intervention during the period of falling prices of coconut is essential to ensure a remunerative price for the coconut. Pricing based on quality of nut was also a constraint listed out by the farmers. Without engaging a scientific grading and sorting, some traders gave comparatively lower price for the nuts of smaller size. Exploitation by middle men and poor performance of farmer collectives were also listed out as the constraints in marketing of coconut.

Table 4.34 Constraints faced by the farmers in marketing

Constraints/ Problems	**Garrett's score**	**Rank**
Price fluctuation	90	1
High transportation cost	66	2
Inadequate storage and processing facilities	63	3
Lack of market information	53	4
Delayed payments	47	5
Inefficient procurement system	45	6
Pricing based on quality of nuts	43	7
Exploitation by middle men	32	8
Poor performance of farmer collectives	22	9

4.4.2.3 The Constraints Faced by the Domestic Traders in Marketing

Price fluctuation was identified as the major constraints faced by the domestic traders with a Garrett score of 76.67, followed by shortage of raw nuts (75.33), the lack of exclusive market for coconut (59) and lack of infrastructural facilities (56.11) (Table 4.35). Even though the changes in coconut prices benefitted the traders to accrue profits from the price movements, the frequent changes in the price did not seem to be favoring the traders as it creates an ambiguous situation and they could not able to make the correct decision. Shortage of raw coconut as a result of low productivity and high incidence of pests and diseases was also identified as one of the constraints. Additionally, the high bent towards the domestically produced coconut among the consumers led to

the direct purchase of coconut from the farmers which negatively affected the traders and they have to depend on imported coconut from Tamil Nadu and other neighbouring states for the smooth trading. The lack of exclusive market for coconut and infrastructural facilities has checked the traders to market the product in a remunerative manner. In northern districts, the traders mostly sold the produce collected from the farmers to the agents of Tamil Nadu with a minimum margin. The high cost of marketing was also identified as the constraints faced by the traders and due to this fact the traders were disposing the bulk quantity of nuts to the agents of Tamil Nadu. Those traders who were selling the produce in the retail shops of the domestic market have to incur much marketing cost for disposing the product. Low keeping quality of the product was also identified as one of the limitations affecting the traders and due to this reason the traders could not stock the products for a long time. Furthermore, the comparatively lower price of adulterated coconut oil adversely affected the millers and processors of coconut oil as low-income households, mostly preferred the low priced oil available in the market. Financial constraints, delay in getting payment and lack of market information were also identified as the constraints faced by the domestic traders.

Table 4.35 Constraints faced by the domestic traders in marketing

Constraints/ Problems	**Garrett's score**	**Rank**
Price fluctuation	76.67	1
Shortage of raw nuts	75.33	2
Lack of exclusive market for coconut	59.00	3
Lack of infrastructural facilities	56.11	4
High cost of marketing	48.91	5
Low keeping quality of the products	47.40	6
Availability of adulterated coconut oil	45.51	7
Financial constraints	35.62	8
Delay in getting payment	32.42	9
Lack of market information	22.02	10

4.4.2.4 The Constraints Faced by the Upcountry Traders in Marketing the Produce

The exporters of coconut products were asked to rank their limitations in coconut export. The high price of domestic coconut was seen to be the major constraint concerning the traders and it was placed first with Garrett score of 77.20 per cent (Table 4.36). According to their view, the global market of coconut has been very cheap and large flux of low priced coconut and coconut products was coming from the coconut producing countries like Indonesia and Thailand. The low cost of production of coconut in those countries helps to maintain a comparative advantage in coconut trade and facilitated the export of coconut products into the global market at a cheaper rate. The cheap availability of coconut and coconut products in the global market was identified as the second major constraint with a Garrett score of 72.93 per cent. Even though Indian coconut retained the superior quality over the coconut produced from other countries, a high price difference between the two has been favoring the other countries in the export market. The shortage of coconut was identified as the 3rd major constraint with a Garrett score of 64.53 per cent. The low production and productivity coupled with the high domestic demand of raw coconut were led to the shortage of raw coconut to meet the export demand. The traders even dependent on nearby states especially, Tamil Nadu and Karnataka to meet the domestic consumption requirement of Keralites. Besides, the shortage of raw coconut owing to the high domestic demand forced the exporters to buy coconuts from Tamil Nadu. On similar lines, Mathews (2017) also noted that quality raw nut shortage was one of the major restraints affecting the manufactures of coconut oil, virgin coconut oil, and desiccated coconut oil. A similar findings were also reported earlier by Narayanan and Bastine (2004). The other constraints listed out by the exporters were high competition with Garrett score of 51.73, price fluctuation (50.67), low keeping quality of the products (49.00), financial constraints (41), tedious export procedures (35.27) delay in getting foreign payment (34.13), and exchange rate variation (22.53). The major exporters in the

sector have elaborated that due to the stringent quality standard followed in the export market of coconut products, there always exists a treat of consignment rejection owing to the low keeping quality of the coconut products. In similar line Mathews (2017) also reported that shortage of good quality raw material was the main constraint facing the coconut oil processors in Kerala. The delayed foreign payment was also pointed as one of the limitations and they remarked that the payment of foreign consignment takes two or three months' time lag.

Table 4.36 Constraints faced by the upcountry traders in marketing

Constraints/ Problems	Garrett's score	Rank
High domestic price of raw coconut	77.20	1
Availability of coconut products at cheaper rate in the global market	72.93	2
Shortage of raw coconut	64.53	3
High competition	51.73	4
Price fluctuation	50.67	5
Low keeping quality of the products	49.00	6
Financial constraints	41.00	7
Tedious export procedures	35.27	8
Delay in getting payment	34.13	9
Exchange rate variations	22.53	10

4.4.3 Suggestions to Improve the Performance of Coconut Trade from Kerala

The present study revealed that in the export of coconut products India has got the comparative advantage only in coconut and copra. Coconut oil and desiccated coconut didn't possess any comparative advantage in trade. Similarly the competitiveness and comparative advantage of coconut production in Kerala revealed that the state lack comparative advantage in the production of coconut oil and without much support from the government, the production of coconut oil not at all competitive. Being the significant producer of coconut and significant contributor of coconut area in the country, there is scope for improving the performance of coconut trade from Kerala. In the light of the present study the

following suggestions are made to improve the performance of coconut trade from Kerala.

4.4.3.1 Suggestions to Improve the Coconut Production in Kerala

As observed in all sectors severe labour shortage and high cost of labour is the major problem faced by coconut sector in the state. The problem is aggravated in coconut cultivation as the harvesting requires skilled labourers. This will increase the wage rate also. Farmers also face scarcity of skilled labourers. So the present study suggests proper intervention by the local government in this regard. The MGNREGA and similar Government programmes should be oriented more towards agricultural works. The government can assign agricultural works to the MGNREGA labourers in nearby areas as per the requirement of the cultivators. Apart from providing the regular wage rate through MGNREGA, the government can ask the farmers to pay some reasonable amount to the labourers. In case of skilled labourers, the government has been implementing so many programmes like Friends of Coconut Tree (FoCT) to enhance the participation of youth in coconut climbing. Even though these programmes bring out large numbers of skilled labourers, the success percentage was very low as the younger generations were not attracted to this risky job. Besides, the new coconut climbing machines available in the market also need the skill and expertise to use. Karshika Karma Sena under certain Krishi Bhavans are also good initiatives in this regard which can be emulated by other panchayats. The development and popularization of dwarf varieties will also limit the requirement of skilled labourers in the harvesting and crop management practices.

The problems related to pest and disease attack can be addressed by developing promising resistant varieties. The prevalence of root (wilt) and lack of proper curative measure for the same is the serious problem faced by the farmers. Replantation of unproductive and senile palm with hybrid varieties in the disease prone areas will also help to increase the production and productivity in the long-run. In similar lines Thamban *et al.* (2016) also observed that cut and removal of

severely affected coconut palms, maintenance of proper palm density and replanting with high yielding planting materials along with suitable agronomic practices helps to increase the coconut production in Kerala. Among the hybrid varieties, Kalparaksha and Kalpasree were the tolerant varieties suggested by the CPCRI for the root (wilt) affected area (Jnanadevan, 2013). The Lack of proper management practices due to the shortage of skilled labour and high wage rates was led to the high incidence of pest and disease attacks. The replantation of coconut gardens with dwarf and high yielding varieties will help to overcome this problem and also facilitates the farmers to do the management practices by themselves. In similar lines Jnanadevan (2014) also opined that coconut varieties with reduced height facilitate the safe and effective management of coconut plantation.

Even though the domestic price of coconut is very high, the farmers did not get the remunerative price for the products. The cost of production per unit of nut is really high in Kerala compared to other major producing countries and the high cost of production, in routine, offers very little margin to the coconut farmers. The farmers will enjoy the benefit of high prices only if they can cultivate the coconuts with the least cost. Fragmented nature of holdings prevented the farmers from accruing the benefits of economies of scale. However, the Farmer Producer Organizations (FPOs) and farmer collectives were helping to solve this issue in some extent and it will also help to improve the socio-economic development of the farmers through improving production and productivity, reducing the cost, utilizing the opportunities of value addition and by-product utilization and through efficient marketing. Similar to this observation Gopalakrishnan (2018) and Madassery (2015) also noted that Farmer Producer Organizations (FPOs) were providing a fair, steady and reasonable income to the farmers by organizing the sector through farmer collectives.

The shortage of quality seedling can be minimized by producing promising coconut seedlings by research institutions and state agricultural universities and distribution of seedling through the Krishi Bhavans at subsidized

prices. Initiate new breeding studies in coconut for the development of promising varieties that have characteristics like low height (dwarf varieties), high productivity, high resistant to pest and diseases and long life span. To enhance the supply of quality seedlings seven demonstration cum seed production farms were established in the country with the help of CDB. Hence, to produce better seedlings at the domestic level, it is essential to provide training and motivation for those farmers and private entrepreneurs who have good financial back up to start a quality seed production farm along with the assistance from the Government. Such production farms should be focused on the production of quality seedlings or desired cultivars or varieties suitable for the locality. To complement the suggestion, Thamban *et al.* (2016) reported that enhanced production of seedlings through establishing more number of nucleus seed gardens would help to increase the availability of quality seedlings. Follow-up measures should be carried out to get feedback from the farmers about the new hybrids released from the state and central institutions.

The productivity of the palm can be improved only through the cultivation of hybrid varieties. For a sustainable growth of coconut sector, it is recommended to cultivate tall, dwarf and hybrid varieties in the ratio of 60:20:20 (Thamban *et al*., 2016). However, the coconut palms in the study area were mostly traditional tall varieties and only had average productivity of 80 nuts per palm per year. Besides, the prevalence of senile palm was also high in Kerala. Through CDB, the Government has been implementing a programme for cutting and removing the old, senile, and unproductive and disease advanced palm population, replanting with quality seedlings and rejuvenation of the existing gardens through an integrated package of practices. Assure the proper functioning of this programme and make provision to provide quality planting materials produced from the state departments and state agricultural universities with a subsidized price to the farmers.

Lack of suitable Mechanization was also a constraint faced by the farmer. The prevalence of small and marginal holdings and fragmented nature of holdings

restricted the farmers in using the machine power extensively. However, labour shortage and resultant hike in the wage rates were forced the farmers to adopt mechanization practices largely. Now for clearing the land, land preparations and pit making farmers in the area were mostly depended on mechanical power. Some Krishi Bhavans also had provision to provide tractor and tiller to the needy people with minimum hiring charges. The focused group discussion with the farmers unveiled the need for the development of new machinery that is suited to the intercropped situations. According to their view, coconut is grown as an intercrop in state and hence intercultural operations using tractor and tillers were not found to be helpful to the farmers. The government should also make arrangements like custom hiring services to provide these types of machinery to the needed farmers through Krishi Bhavans.

Lack of irrigation facilities can be mitigated through the provision to provide pump and drip system at a subsidized rate through Krishi Bhavan in a phased manner. Lack of timely support from the government was also a problem experienced by the farmer. The government has been implementing several programmes for the rejuvenation of the coconut sector in Kerala. The follow-up measures should be done to ensure the success of such programmes. More attention should be given to those farmers who have more area under coconut cultivation than those people with a very less area. Besides, the Government should ensure that the support (either in terms of money or input) required by the farmers will be given in proper time for reaping the real benefit.

4.4.3.2 Suggestions to Improve the Marketing Constraints Faced by the Farmers

Price fluctuation was the main marketing constraint faced by the farmers. Like any crop, frequent price fluctuation may lead to reduce the lack of interest among farmers for the cultivation of the crop. To protect the farmers, the government had fixed, MSP for copra since 1980s and its procurement through NAFED to reduce the price fluctuation and to support the farmers during the periods of very low coconut price. However, the focused group discussion with

farmers in the study area revealed that due to the lack of good infrastructure facilities and high labour charges they could not able to do even primary level processing and thereby did not receive the benefit of MSP by the Government. The majority of the farmers sell the coconut as raw instead of copra and coconut oil. According to the farmers' perspectives, to ensure benefit to the coconut farmers' government should continue the procurement operation through the Krishi Bhavans and also make necessary initiatives for the processing of procured coconut with the help of farmer producer organizations. In similar lines Thamban *et al*. (2016) also pointed out that the procurement through Krishi Bhavan found to be beneficial to the farmers and along with procurement, necessary facilities for safe storage and primary processing of nuts into copra will be beneficial to the farmers. Besides Krishi Bhavans, Farmer Producer Organizations (FPOs), cooperatives and SHG's should be involved in the procurement of raw coconut operation.

Inadequate storage and processing facilities was also found to be the major constraint faced by the farmers. GOI (2017) reported that lack of efficient procurement agencies at the grass root level and inadequate storage and processing facilities were the constraints of the MSP operation of copra through NAFED. The establishment of good storage and processing plants in the main coconut producing areas will be helpful for the farmers in this direction. To reduce the government burden infrastructure facilities needs to be developed through public private partnership. The farmers have to pay some reasonable rate for the processing of the produce if they approach such a partnership organization. This action will help both farmers and traders for the production of good quality processed products.

Proper dissemination of market information through news channels, newspapers and other government portals should be ensured. Design suitable mobile app in such a way that it should provide the details like market price, district wise market arrival, future expectation of price, risk condition etc. to the

registered coconut farmers. An online marketing platform which will be capable of connecting the producers and buyers should be established.

The inefficient procurement system was also a problem faced by the farmers and it needs to be addressed. The procurement of raw coconut instead of copra will be beneficial to those farmers who disposed the product as raw nuts. In Kerala most of the farmers preferred to sell coconut as raw nut due to the lack of storage and processing facilitates and high labor cost associated with the processing. Therefore, procurement of raw coconut through KrishiBhavans, FPOs and SHGs and further processing of the product at cooperative levels will be beneficial to both farmers and traders in the states.

Pricing of the product based on quality of nut was also a problem experienced by the farmers mainly in the Thrissur and Kozhikode district. Sorting the produce and fixing the price based on quality will benefit the farmers to get a better price. Fix premium price for those nut which possessed required size and weight needed for the export purpose.

To reduce the exploitation of the farmers by market mediators, it is essential for the requirement of regulated market exclusively for the coconut. Strengthen the farmer collectives to collect the raw nuts and further it's processing. Ensure the proper functioning of FPOs and CPCs and the government interventions also done to ensure the proper functioning of the same.

4.4.3.3 Suggestion to Improve the Marketing Constraints Faced by the Domestic and Upcountry Traders

In order to reduce the price fluctuation, long-term policies for the price stabilization of coconut and other coconut products are inevitable. Jayasekhar *et al.* (2014) opined that any price rises due to the demand forces are quite stable and the price rises due to the supply factors are not last for a long time. Even though the recent hike in coconut price favored the farmers through giving high margin for their produce, this was majorly raised due to the supply factors. The rise in domestic coconut price also led to the import of cheap coconut from other major

producing countries especially ASEAN countries. To strengthen the infrastructure facilities like storage and processing facilities at the grass root levels to get profit to the traders due the fluctuations in price. Along with the raw coconut and its processed form, if the traders are actively involved in the marketing of coconut shell, coir pith, charcoal, etc. it will reduce the cost per unit quantity of commodity transported. Low keeping quality of coconut and coconut product was observed as one of the constraints faced by the traders due to the rancid nature of coconut oil. Research studies should be carried out to increase the keeping quality of coconut especially, coconut oil. Proper packaging facilities should be followed to reduce the quality deterioration because the exposure to light, heat and air can cause quick rancidity of the coconut oil. Availability of adulterated coconut oil was also a constraint faced by the domestic traders. Due to the high price of coconut oil now the domestic market is flooded with adulterated edible oils. In India 8-9 companies have license to blend coconut oil with other edible oils and they market the produce by blending 20 per cent of coconut oil with 80 per cent of other edible oils such as palm and soybean oil. Eighty per cent of the coconut oil available in the domestic markets is adulterated oil. Due to lack of proper processing facilities in Kerala and comparatively low cost of processing in Tamil Nadu, the traders from Kerala are mostly selling the dehusked nuts to the commission agents in the Tamil Nadu. Further the processed oils are mixed with low quality edible oils and then exported back to the Kerala for meeting the domestic consumption purpose. Hence the setting up of quality control lab and mobile labs at border check posts will prevent the entry of adulterated coconut oil into the state.

The high domestic price of raw coconut is the major problem faced by the upcountry traders. Shortage of raw nut due to lower production, productivity and pest and diseases need to be addressed thoroughly. Productivity of coconut must be improved through Good Agricultural Practices (GAP). Among the traditional coconut producing tracts, the domestic consumption has been very high in Kerala, higher domestic consumption coupled with the recent hike in industrial demand of raw coconut led to increase the domestic price of coconut. To supplement this

finding (Jnanadevan, 2017a) also reported that out of the total coconut oil produced in the country 94 per cent is used domestically and only six per cent is exported. When compared to other major producing states, Kerala has good potential to increase coconut production owing to the high area under coconut. Hence integrated effort must be taken to enhance the production and productivity of coconut. Expand the area under coconut cultivation by encouraging the new entrepreneurs to start coconut cultivation in the uncultivated and fallow land. Now the Government is giving Rs. 8000 as incentive assistance to small and marginal farmers for undertaking new planting of coconut and its further maintenance. The information's related to the CDB schemes should be disseminated among the people and provide proper training and encouragement for those people who are interested in coconut cultivation. To increase the export demand of coconut and coconut derived products, measures should be taken to disseminate the results of nutritional and health benefit studies across the world. In 2017, American Heart Association (AHA) again started spreading the news that saturated fats like coconut oil was the prime culprit behind the cardiovascular diseases. Asian Pacific Coconut Community (APCC) taken initiatives to disprove this argument and according to them the observation was mainly based on flawed research and it will endanger the economies of the major coconut producing countries as well as livelihoods of millions of coconut farmers. So to retain and enhance our export share integrated effort should be taken to disseminate our research findings through proper media. Even though the study mostly concentrated in the traditional coconut products, the research reports on coconut revealed that there is an ample scope for diversification and demand of diversified product has been increasing over the years. It was observed from the result that India did not have any comparative advantage in the export of coconut oil as the price of coconut oil in the global market was very low when compared to domestic price. So, in order to reap the maximum benefit, produce that value added products that have good demand and best price in the international market.

In nutshell, the coconut sector in Kerala needs strong support from government to revive and regain its premier role played in the past. In the era of

trade liberalisation and FTAs, it is the responsibility of the government mechanism to safe guards the interests of farmers. It is also imperative to ensure the quality and quantity of the coconut production in the country in order to get remunerative international price. India has strong potential to capture the world market owing to high area under cultivation, high production and productivity. Among the Indian state Kerala has good potential to increase the production and productivity of coconut.

Summary and Conclusion

5. SUMMARY AND CONCLUSION

Coconut is an important crop of economic significance to many Asian and Pacific countries in the world. India stands first in world coconut production and productivity contributing 23798.23 million nuts with striking productivity of 11,350 nuts per ha (2017-18). Even though India holds the first position in the world production of coconut, its contribution to the world export is very less. Signals from the trade sector indicate that the export share of coconut from India is likely to increase over the years. In the liberalized trade regime, it is crucial to assess the challenges faced by the coconut farmers and the opportunities available to the farmer. In this context, the present study entitled "Dynamics and competitiveness of agricultural trade policies on coconut economy of Kerala'' aimed at assessing the impact of trade policies in edible oil on coconut economy of Kerala. Besides impact, the study also explored the competitiveness and comparative advantage of coconut production in Kerala. The efficiency of domestic coconut markets through the identification of marketing channels, market functionaries, marketing costs and marketing margins was also employed. Price transmission and market integration of the domestic coconut oil market with other edible oil markets were also studied. The looming crisis experienced by the coconut farmers and traders was also analysed and some recommendations and suggestions were put forth in order to make coconut competitive in the world market.

Both primary and secondary data were used for examining the specific objectives of the study. Import data of edible oils were mainly obtained from the EXIM data bank, DGCI&S, DGFT and FAO statistics. The import and export data about coconut products and domestic price series of coconut oil were collected from CDB. The international price series of coconut oil and other major edible oils were taken from the World Bank Commodities Price Data. The primary data for the present study was collected using well-structured and pretested schedules through a survey of 90 farmers in the selected districts of

Kerala. To find out the efficiency of selected coconut markets, data was collected from 45 market intermediaries using a well-structured interview schedule.

The coconut industry in the country was holding the privileges of a closed economy until 1995, and significant and sustainable growth in production and productivity was witnessed during the protected regime. The trade liberalization equipped a provision of increased domestic access to other countries and promoted the cheap import of domestically produced goods and its substitutes. Even though reasonable bound duty was fixed in the WTO agreement, the applied rate of import duty was very low and it led to the import of a large flux of cheaply produced oil from the neighbouring countries. Besides, placing of palm oil under the special product category and its phased reduction of tariff also favored the exporting countries of edible oil, which in turn led to a large import of palm oil to India during the post liberalisation period. The palm oil is the close substitute of coconut oil and its availability through fair price shops expedited the substitution of coconut oil with palm oil among lower-income households. Apart from this, hotel and confectionery industry also started to substitute the coconut oil with low priced palm oil and palm kernel oil. All these concomitantly created a situation in India that led to the price crash of coconut oil, that had adversely affected the coconut farmers of India, especially from the southern states.

Though trade liberalization adversely affected the coconut farmers during the initial phase of liberalization, it subsequently increased the opportunities of the Indian coconut sector to compete in the world market. As an outcome of liberalization, India extended trade ties with other countries. Compared to pre-liberalisation, i.e., Period I (1980-81 to 1993-94), a significant improvement in the coconut export was observed during the post-liberalisation regimes, i.e., Period II (1994-95 to 2007-08) and period III (2008-09 to 2016-17). Except coconut oil, the export of all other coconut products manifested negative growth rate during the period I. The high price of coconut oil united with the high domestic demand and export restrictions imposed during that time may have led to the negative growth rate of coconut export during the Period I. Seeds of liberalization prospered

during the Period II, and a tremendous spurt in export was observed during the period. Even though the growth rates were comparatively lower in Period III than that of period II, the quantum of export and export earnings of coconut products increased largely during this period due to the concerted efforts of CDB as an export promotion council.

All the coconut products had shown highest instability index during the period I and a progressive decrease in the instability index were observed in the periods that followed. The result symbolized that the export market is becoming more stable as a result of liberalisation. The value of Revealed Symmetric Comparative Advantage (RSCA), which measures the comparative advantage or disadvantage of a country with respect to another country depicted that India lacked any comparative advantage of coconut export in Period I. While in period II, the export of coconut and copra possessed a comparative advantage from 2002 and 2005, respectively. Throughout period III, coconut and copra export maintained a comparative advantage, whereas desiccated coconut and coconut oil did not hold a comparative advantage in trade in any of the selected period. It was obvious from the study that rather than focusing on the export of coconut oil and desiccated coconut, India must give much effort to increase our export share of coconut, copra and other value-added coconut products to augment the foreign earnings.

The trade policies concerning edible oils at the national level were found to have an impact on the coconut oil prices in Kerala too. Exponential growth rates were computed to compare the growth of edible oil imports and coconut oil prices in Kerala. It was explicit that the exponential growth rate of edible oil import was negative during the Period I, whereas the growth rate of coconut oil price was observed to be positive during that period. The significant improvement in the growth rates of edible oil import and decline in the growth rates of coconut oil price during the Period II confirmed the earlier findings that trade liberalisation and further FTAs facilitated the huge import of edible oil from other countries which unfavorably affected the domestic coconut economy. In period III, the

import duties of most of the substitutable oils were observed to be far less than the bound duty which in turn facilitated the import of edible oils from other countries. But the relatively high growth rates of coconut oil price during the period could be attributed to the high export demand of coconut and coconut-derived products in the global market. From the results, it could be argued that even though trade liberalisation adversely affected the coconut farmers of Kerala in the early liberalisation period, subsequently it would intensify the opportunities for the coconut sector to compete in the world market. Large acreage under coconut, sufficiently high production, access to most modern technologies, good support from the government through CDB, superior quality nuts, knowledge on the production of diversified value-added products are the strength of the coconut sector of Kerala, which would improve the state's position to compete in the world market.

The PAM framework was used to understand the competitiveness and comparative advantage in the coconut oil trade in Kerala. The result of the PAM analysis unveiled that coconut oil production in Kerala was competitive at the given level of technologies, prices of inputs and outputs, and current policy stipulations. However, social profitability, a measure of efficiency or comparative advantage was observed to be negative. The result depicted that coconut oil production in Kerala lacks comparative advantage in production and the state was not able to use the available resources efficiently. The trade indicators derived from PAM mainly indicated that private competitiveness and private profitability were mainly the results of extensive support by the government through different programmes and policies.

The coconut market in Kerala has been always unstable and uncertain due to frequent fluctuations in prices. But stable markets and lucrative farm gate prices are the major driving forces that determine the persistence in the production and productivity of the farms, especially in traditional growing states. The marketing of coconut is more complex in Kerala as the majority of the farmers are unorganized and scattered. So it was considered worthwhile to study the

efficiency of coconut markets in order to understand whether coconut cultivation is a profitable enterprise for domestic farmers or not. Local traders and retailers are the main marketing agents involved in the marketing activities of coconut in Thiruvananthapuram district. Direct marketing without the interference of any marketing intermediaries was found common in the study area. When the produce is directly sold to the consumers, the producers share in consumer's rupee and marketing efficiency was high. The low productivity of coconut palm coupled with high domestic demand in the study area necessitated the import of nuts from other states, especially Tamil Nadu. The low quality of coconut from Tamil Nadu positively influenced those farmers who had surplus production as the consumers resorted to direct purchase paying amount more or less equal to the market rate.

In Thrissur district, village traders, copra makers, oil millers, CPCs and retailers are the main marketing mediators involved in the marketing of coconut. The marketing of coconut through private CPCs was becoming more popular among large farmers. Farmers in the area did not employ any type of processing mainly due to the scarcity of labour and high labour cost. Of the four channels identified, except channel I (farmers-village traders-retailers-consumers), the processed form of coconut, i.e., coconut oil is ultimately sold to the consumers and thereby incurring high marketing cost and marketing margin. The high marketing cost and margin, in turn, reduced the producer's share in consumer's rupee and marketing efficiencies.

Village traders, marketing agents, copra makers, oil millers, wholesalers and retailers are the main marketing intermediaries associated with the marketing activities of coconut in the Kozhikode district. Even though Channel 1 (farmer-village traders-marketing agents-copra makers-oil millers-wholesalers-retailers-consumers) is the dominant marketing channel in the study area, the high marketing cost is associated with this channel and accounted for 18.92 per cent of the consumer price. In channel I, farmers sold the nuts to the village traders and village traders, in turn, sold the collected nuts to the marketing agents of Tamil Nadu. The processing of coconut was mainly carried out in Tamil Nadu due to the

low cost associated with processing and better infrastructural facilities available. The processed coconut oil was again sold to the wholesale dealers in Kerala. The existing price differences between Kozhikode and Kangayam market favoured the oil millers to get a reasonable profit from this marketing activity.

The outcome of the marketing analysis showed that as the number of intermediaries' increases, the producer's share in consumer's rupee and marketing efficiencies decrease owing to the high marketing cost and marketing margin. Besides, high wage rates, shortage of skilled labour, lack of processing technologies, adverse climatic conditions, etc., obstruct the farmers in doing even the primary level processing and thereby it reduces the producer's share in consumer's rupee.

The nature and extent of price transmission between domestic coconut oil and other international edible oils were analysed using the Maximum Likelihood Estimation (MLE) procedure by Johansen and Juselius. The result established the co-movement of prices between domestic coconut oil and other international edible oils during Period II and Period III. The result further revealed that the liberalisation policies and further free trade agreements have resulted in the transmission of price signals in a better way between domestic and international edible oil markets and it led to the integration of these markets during the post-liberalisation period. The VECM model was applied to evaluate the short-run properties of the co-integrated series. The result of the VECM model depicted that changes in international prices of edible oils were observed to cause changes in the price of the domestic coconut oil market in the long-run during Period II, Period III and overall study period. The short-run coefficient from the VECM depicted that short-run price changes in the international coconut oil did not influence the domestic coconut oil price while the short-run price fluctuations in the domestic coconut oil influenced the price of international coconut oil during Period II and overall study period. The result was further confirmed through Wald test and the result revealed the presence of short-run causality from domestic

coconut oil price to the international coconut oil price during Period II and overall study period.

Suggestions for improving the performance of coconut trade chiefly emerged from Focus Group Discussion with farmers and traders. High wage rate, labour shortage, high incidence of pests and diseases, lack of remunerative price for the crops and high cost of inputs were the major production constraint faced by the farmers. The challenges in the coconut production can be addressed through the incorporation of agricultural operations in MGNREGA, the shortage of skilled labours can be lessened through government programmes like Friends of Coconut Tree (FoCT). The development and popularization of dwarf varieties will also limit the requirement of skilled labourers in harvesting and crop management. The problems related to pest and disease attacks can be addressed by developing promising resistant varieties. Replantation of unproductive and senile palm with hybrid varieties in the disease-prone areas will also help to increase the production and productivity in the long-run. The Farmer Producer Organizations (FPOs) and farmer collectives were helping to reduce the per-unit production cost and thereby farmers can enjoy the benefits of economies of scale.

Price fluctuation, high transportation cost, inadequate storage and processing facilities, lack of market information, delayed payments and inefficient procurement system are the major marketing constraints faced by the farmers. Long-term policies for the price stabilization of coconut and other coconut products are inevitable to reduce the price fluctuation. The government should continue the procurement operation through the Krishi Bhavans as it is found to be beneficial for the farmers and in turn, reduces the price fluctuation to some extent. Establishment of better infrastructure facilities in the main coconut producing areas will be helpful to the farmers for doing the processing of coconut and thereby enhancing their share in consumer's rupee. Proper diffusion of market information through mass media and online platforms should be ensured to benefit the farming community. An online marketing platform which will be capable of connecting the producers and buyers may be established.

Price fluctuation, shortage of raw nuts, lack of exclusive market for coconut, lack of infrastructural facilities, high cost of marketing, low keeping quality of the products and presence of adulterated coconut oil were the major constraints faced by the domestic traders. Likewise, the high domestic price of raw coconut, availability of coconut products at a cheaper rate in the global market, shortage of raw coconut and high competition were the major restraints faced by the upcountry traders. The recent increase in the domestic price mainly emerged due to the short supply coupled with high domestic and industrial demand. Shortage of raw nut due to lower production, productivity and pests and diseases needs to be addressed seriously. The productivity of coconut must be improved through Good Agricultural Practices (GAP) and through expanding the area under coconut cultivation by encouraging the replantation of senile palms and promoting coconut cultivation in the uncultivated and abandoned land. Along with the raw coconut and its processed form, if the traders are actively involved in the marketing of coconut shell, coir pith, charcoal, etc. it will reduce the cost per unit quantity of commodity transported. Research studies should be carried out to increase the keeping quality of coconut, especially, coconut oil and proper packaging facilities should be followed to reduce the quality deterioration. Setting up of a quality control lab and mobile labs at border check posts will prevent the entry of adulterated coconut oil into the state. To increase the export demand for coconut and coconut-derived products, measures should be taken to disseminate the results of nutritional and health benefit studies across the world.

In the era of trade liberalisation and FTAs, it is imperative to safeguard the interests of farmers. Given the present trade scenario, the coconut sector in Kerala needs strong support from the government to revive and retrieve its premier role performed in the past.

Policy implications

The policy recommendations are as follows

- The import tariff of edible oil was far less than the bound tariff and hence proper government intervention should be exerted to

restructure the tariff level, otherwise the high domestic price of coconut oil would trigger the import of large quantities of other edible oil into the domestic economy, and it will negatively affect the coconut farmers and the industry as a whole.

- Government should take initiative to study the long-term micro and macro level implications of FTAs like Regional Comprehensive Economic Partnership (RCEP). Before implementing such agreements the challenges and prospects that might arise due to the agreement in each sector of the country needs to be thoroughly analysed.
- The price spirals arising due to the supply factor is always a matter of concern. It will create a threat to the domestic industry by removing the coconut and its products from the exclusion list in the trade agreements. As a consequence, a large quantity of import of coconut and its products from neighbouring countries occur and which may bring down the protection given to the domestic coconut economy. To avoid the situation, specific long-term price stabilization measures have to be implemented by the government.
- Even though India's share in world coconut export was very less, the high growth rates of coconut products experienced during Period II and Period III together with low instability indices in the export revealed the prospects for Indian coconut sector in the global market. So, the finest arrangement should be taken to streamline the production to meet the export requirement also.
- The study reveals that coconut oil and desiccated coconut did not possess any comparative advantage in global trade, while coconut (fresh and dried) and copra has comparative advantage. Hence, to enhance the export earnings through the trade, it is imperative to concentrate on the trade of those commodities that have a comparative advantage in export.

- The value addition and byproduct utilization were very less in Kerala. So, initiatives should be taken to strengthen infrastructural facilities, mainly in the coconut producing tracts. The FPOs should be strengthened to take up value addition of coconut products and byproducts so that farmers will get a remunerative income and in addition, it will also helps to increase the export earnings.
- Owing to the large area under coconut, Kerala is having good potential to increase productivity and thereby production. So integrated measures including replanting should be taken to enhance production and productivity to meet both domestic and export requirements.
- To increase the export demand for coconut and coconut-derived products, measures should be taken to disseminate the results of nutritional and health benefit studies across the world. Efforts to disprove the false propaganda against coconut oil, backed up by scientific evidences may be taken up by the state.
- Due to the stringent quality standard followed in the export market of coconut products, there always exists a threat of consignment rejection owing to the low keeping quality of the coconut products. Hence, extensive research is needed to enhance the keeping quality of coconut and its products. Besides, strict sanitary and phytosanitary measures should be adopted from planting onwards to improve the quality of the final product.

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Appendices

APPENDIX I
Survey Questionnaire

KERALA AGRICULTURAL UNIVERSITY (KAU)
KAU P.O
Vellanikkara, Thrissur 680656
Department of Agricultural Economics

Dynamics and competitiveness of agricultural trade policies on coconut economy of Kerala

Interview Schedule for farmers

Schedule No…….

District: Block: Panchayat

:

1. Name & Address of the farmers:

a. Name of the farmer:

b. Address and Phone no.

c. Age:

d. Gender:

f. Experiencing in farming (Years):

2. Family Details

Name	Gender (M/F)	Age	*Education	**Occupation		Annual income	
				Primary	Secondary	Primary	Secondary

*01-Primary,02-Secondary, 03-Pree- degree/HSC, 04-Diploma, 05-Graduate, 06-Post Graduate
**1-Agriculture, 2-Public sector, 3-Private sector, 4-Self employed

3. Details of land holdings:

Particulars	Owned (ha)	Leased in(ha)	Leased out (ha)	Total (ha)
Wet land				
Garden land				
Permanent fallow				
Total (ha)				

4. Crop Details

Sl. No.	Crop	Variety	Cropped area (ha)	Main product		By-product	
				Qty (Kg)	Value (Rs.)	Qty (Kg)	Value (Rs.)

5. Details of non crop/ Allied activities

Sl. No.	Activities	Area/ No.	Annual maintenance expenditure	Gross return
1	Dairy			
2	Poultry			
3	Fish farming			
4	Self employment			
5	Others			

6. Details of coconut farm

a. Age of plantation:

b. Area:

c. No. of trees:

d. No. of yielding trees:

e. No. of harvesting per year:

f. Main product yield (nuts/palm for each harvest):

g. Price/nut:

h. By-product yield:

i. Price/unit:

7. Cost of cultivation of coconut

7a. Expenses on fixed inputs

Fixed inputs	Year of purchase	Initial cost (Rs)	Useful life (years)
Land value			
Farm building			
Others (Specify)			

a. Rental value of land:

b. Land revenue:

c. Irrigation cess (if any)

7b. Expenses incurred on machinery and equipments

Machinery and equipments	**Quantities**	**Year of purchase**	**Initial cost**	**Subsidy (if any)**	**Useful life (years)**
1.Pump set (No) 2.Spade (No) 3.Gunny sac (No) 4.Plastic sac (No) 5. Basket (No) 6. Machete (No) 7. 8. 9.					

7c. Input and Operational-wise Expenses

Variable inputs	Year 1	Year 2	Year 3	Year 4 onwards
Seedlings (No)				
FYM (kg/palm)				
Urea (g/palm)				
SSP (g/palm)				
MOP (g/palm)				
Other fertilizers (g/palm)				
Plant protection chemicals				
Soil ameliorants (Rs)				
Irrigation cost (Rs)				
labour (separately mention family labour as (f) and hired labour as (h))				
Land preparation	M= F=	M= F=	M= F=	M= F=
Digging, filling and planting	M= F=	M= F	M= F=	M= F=
Manure and fertilizer application	M= F=	M= F=	M= F=	M= F=
Pesticide application	M= F=	M= F=	M= F=	M= F=
Intercultural operations	M= F=	M= F=	M= F=	M= F=
Irrigation	M= F=	M= F=	M= F=	M= F=
Harvesting				M= F=
Collection & handling	M= F=	M= F=	M= F=	M= F=
Post harvest operations (Processing if any)				M= F=

8. Wage rate (2016-17)

	Skilled labour		Unskilled labour	
	M	F	M	F
Wage rate (Rs/man days)				

10. Rate of different inputs (2016-17)

Inputs	Rate (Rs/Kg)	Subsidies	
		(Rate/unit)	Total amount
FYM			
Urea			
SSP			
MOP			
Other fertilizers			
Pesticides (Rs/unit)			
Soil ameliorants (Rs/unit)			
Seedlings (Rs/ unit)			
Other input (Specify)			

11. Details of marketing of coconut

a. Total quantity produced:

b. Quantity retained for family consumption:

c. Quantity retained for on-farm uses:

d. Total marketed quantity:

e. Name of the nearest primary market:

f. Distance:

g. Name of the nearest wholesale or secondary market:

h. Distance:

12. Method of sale:

Sl. No	Method of sale	Quantity	Price/unit
1	Village trader		
2	Commission agent/ brokers		
3	Primary/ retail market		
4	Secondary/wholesale market		
5	Direct sale to consumers		
6	Other modes (specify)		

13. Do you know through which channel your produce will reach to ultimate consumer?

a. Channel 1 – Producers- village trader-wholesaler-retailer-consumer

b. Channel 2 – Producer- wholesaler-retailer-consumer

c. Channel 3 – Producer- village trader-retailer-consumer

d. Specify other channels if any?

14. Reasons for sales to the local trader/ wholesaler/ consumer/commission agents/agencies

15. Price received per unit:

16. Mode of payment:

17. Do you know the price at which final intermediary sell the produce to ultimate consumers?

18. Marketing cost incurred

a. Transportation cost -

b. Commission/brokerage - Total marketing cost:

c. Storage cost -

d. Loading and unloading -

e. Other cost for marketing -

19. In which form do you mostly marketed the produce (coconut with husk/without husk):

20. Price difference between the two nuts (nuts with husk/without husk):

21. Cost of de husking (Rs/nut):

22. Do you engaged in processing of coconut before selling: (Yes/No)

23. If yes, in which form do you sell the produce:

24. Quantity processed:

25. Cost of processing:

26. Price received for the produce after processing:

27. Are you engaged in storaging of the produce?

28. Time period of storage:

29. Method of storage:

30. Do you have any pre contract tie up with any agencies for marketing the produce? (Yes/NO)

31. If yes, since which year? Mention the amount of produce sold to agencies and the price per unit?

32. Sources of information on price data?

33. Details of contact with developmental agencies?

Sl. No	Agencies	Type of Assistance			
		Planting material	Technology	Subsidy	Marketing
1	CDB				
2	Department of				
3	KAU				
4	Co-operatives				
5	NGO				
6	Others				

34. Details of credit:

Have you availed any credit? Yes/ No (Specify year also)

Sl. No.	Sources of finance	Type of loan			Loan amount	
		ST	MT	LT	Taken	Outstanding
1	Nationalised					
2	Co-operative					
3	Gold loan					
4	Money lender					
5	Friends and relatives					
6	Others					

35. Are you engaged in exporting of the produce: (Yes/No)

36. If yes, the quantity exported and the details of importing country or agencies

37. Do you have a RCMC certificate for exporting the produce: (Yes/No):

38. If yes, give details about that certificate and mention the advantage of having that certificate

39. Are you a member of any producer organization/ society /federation: (Yes/No):

40. If yes, mention the details of society and joining date?

41. Do you getting any specific advantageous from that society?

42. Production constraints

Sl. No.	**Constraints/ Problems**	**Rank**
1	Labour shortage	
2	High incidence of pest and diseases	
3	High wage rate	
4	High cost of input	
5	Low productivity of the palm	
6	Lack of irrigation facilities	
7	Lack of adequate finance	
8	Lack of timely support from the government	
9	Other constraints (Specify)	

43. Marketing constraints

Sl. No.	**Constraints/ Problems**	**Rank**
1	Price fluctuation	
2	Exploitation by middle men	
3	Inadequate storage and processing facilities	
4	Lack of market information	
5	High transportation cost	
6	Poor performance of farmer collectives	
7	Delayed payments	
8	Other constraints (Specify)	

Interview schedule for intermediaries

1. Name and address of respondent:

2. Age:

3. Sex:

4. Type of market intermediary:

    Village merchant/ commission agents/wholesaler/ retailer/ exporter

5. No of years of experience in coconut trading:

6. Main product(s) dealt with:

7. Quantity (volume) of transaction/year:

8. Do you have any shop or stall for marketing the produce?

9. If yes, mention the location, size and number of stalls:

10. From whom you mostly purchased?

11. Mode of purchase:

12. Quantity purchased/ year:

13. Average price paid/unit:

14. Purchase place and distance from market:

15. Mode of transport:

16. Transporting charges:

17. Loading and unloading charges:

18. Drying charges if any:

19. Other processing expenses if any:

20. Packaging cost:

21. Storage cost:

22. Average loss in handling:

23. Brokerage:

24. Other expenses:

25. Average retention time:

26. To whom the product sold:

27. Mode of sales:

28. Market fee:

29. Other charges:

30. Price received (Rs/kg):

31. Marketing constraints

Sl. No.	Constraints/ Problems	Rank
1	Price fluctuation	
2	Lack of regulated market	
3	High cost of marketing	
4	Lack of infrastructural facilities	
5	Financial constraints	
6	Delay in getting payment	
7	Other constraints (Specify)	

APPENDIX II

Import of edible oils into India (tonnes)

Year	Palm oil	Palm kernal oil	Soybean oil
1980-81	721645.00	707.00	762058.00
1981-82	545962.00	18466.00	635300.00
1982-83	553266.00	2823.00	527808.00
1983-84	646925.00	13433.00	439733.00
1984-85	491719.00	11045.00	550621.00
1985-86	662200.00	500.00	422000.00
1986-87	875673.00	16308.00	183580.00
1987-88	1096954.00	3069.00	494681.00
1988-89	612082.00	1212.00	199949.00
1989-90	281450.00	7935.00	30271.00
1990-91	487411.00	5455.00	25276.00
1991-92	191717.00	3854.00	21729.00
1992-93	207000.00	464.00	61960.00
1993-94	73268.00	2761.00	28728.00
1994-95	287498.00	65.00	38528.00
1995-96	850397.00	161.00	101485.00
1996-97	1113850.47	77.20	21362.56
1997-98	1044406.58	346.90	45736.51
1998-99	1608056.14	13190.20	439625.13
1999-00	2868429.23	10142.44	609825.33
2000-01	3054923.01	37734.42	582984.01
2001-02	2733118.76	51873.67	1357929.42
2002-03	3052625.16	43200.71	1196534.67
2003-04	4026435.62	141027.16	993498.37
2004-05	3503364.97	98975.57	1092652.74
2005-06	2449183.84	109667.35	1651132.45
2006-07	2766382.33	127450.76	1216349.78
2007-08	3514900.25	147322.39	1138892.52
2008-09	5549426.99	152828.09	698772.90
2009-10	6102340.83	242868.61	1100879.40
2010-11	4990674.79	154648.83	1132030.83
2011-12	6565746.79	136022.46	894698.59
2012-13	8426133.08	224338.99	1123094.05
2013-14	7684309.81	262771.69	1345162.24
2014-15	8164522.36	198214.90	2317178.92
2015-16	9683651.37	175389.71	3965137.12
2016-17	8298752.61	51257.50	3464598.02

Source: Author’s compilation from FAOSTAT and DGCIS

APPENDIX III

Price of coconut oil in major markets of Kerala (Rs./100 kg)

Year	Kochi	Kozhikode	Alappuzha	Average
1980-81	1572	1570	1571	1570.94
1981-82	1306	1312	1305	1307.56
1982-83	1558	1560	1554	1557.28
1983-84	2396	2387	2395	2392.56
1984-85	3239	3216	3233	3229.45
1985-86	1701	1698	1700	1699.69
1986-87	2433	2430	2433	2432.19
1987-88	3158	3080	3103	3113.78
1988-89	3061	3047	3059	3055.36
1989-90	2321	2320	2320	2320.25
1990-91	3039	3043	3034	3038.33
1991-92	4323	4326	4290	4312.81
1992-93	4576	4666	4581	4607.81
1993-94	3551	3734	3550	3611.72
1994-95	3254	3419	3250	3307.36
1995-96	3694	3841	3705	3746.64
1996-97	4906	5050	4879	4944.72
1997-98	4866	5020	4862	4916.00
1998-99	4586	4728	4585	4632.81
1999-00	5249	5471	5251	5323.50
2000-01	3100	3352	3096	3182.89
2001-02	3252	3456	3255	3320.94
2002-03	4851	4948	4815	4871.36
2003-04	6038	6141	6024	6067.75
2004-05	6758	6846	6754	6786.11
2005-06	5078	5101	5087	5088.66
2006-07	5036	5053	5014	5034.33
2007-08	4980	4954	4975	4969.65
2008-09	5963	6087	5966	6005.14
2009-10	4805	4842	4815	4820.58
2010-11	6822	6867	6806	6831.81
2011-12	8479	8604	8510	8530.83
2012-13	6275	6455	6276	6335.06
2013-14	8847	9592	8792	9076.72
2014-15	14745	15566	14590	14967.17
2015-16	11161	11646	10808	11204.98
2016-17	10258	10530	10242	10343.33

Source: Compiled data from CDB

APPENDIX IV

Details of costs and Returns from coconut (Private Price)

		1'st year	2'nd year	3'rd year	4th -7th year	8th-15th year	16th year onwards
Inputs	**Tradables(Rs/Ha)**	-	-	-	-	-	-
	Non tradables (Rs/Ha)						
	Seedlings	13125.00	675.00	-	-	-	-
	lime	831.25	831.25	831.25	997.50	1662.50	1662.50
	Farm Yard Manure	6562.50	6562.50	6562.50	8750.00	15312.50	15312.50
	Other fertilisers	2100.00	3675.00	3675.00	4900.00	8225.00	8225.00
	Plant protection chemicals	-	-	-	2625.00	2625.00	2625.00
	Electricity	300.00	300.00	300.00	300.00	300.00	300.00
	Fuel (litres)	-	-	-	-	-	-
	Total input cost	22918.75	12043.75	11368.75	17572.50	28125.00	28125.00
Factors	**Labour (Rs/Ha)**						
	Land preparation	1950.00	-	-	-	-	-
	Digging, filling and planting	15600.00	1300.00	-	-	-	-
	Manure and fertilizer application	3900.00	3900.00	3900.00	5200.00	13650.00	13650.00
	Intercultural operations	3250.00	3250.00	3250.00	3250.00	8450.00	8450.00
	Crown cleaning and pesticide Applications	-	-	-	2600.00	3900.00	3900.00
	Irrigation	11050.00	9750.00	9750.00	6500.00	6500.00	6500.00
	Harvesting	-	-	-	-	22100.00	22100.00
	Collection and handling	-	-	-	-	3900.00	5200.00
	Dehusking	-	-	-	-	6500.00	8450.00
	Total labour cost	35750	18200	16900	17550	65000.00	68250.00

APPENDIX IV (Continued)

		1'st year	2'nd year	3'rd year	4th -7th year	8th-15th year	onwards
	Capital (Rs/ Ha)						
	Interest on working capital (7%)	4151.48	2161.72	2023.48	2503.24	7550.41	8022.91
	Interest on fixed capital (12%)	2107.00	307.00	307.00	307.00	307.00	307.00
	Tractor services	15000.00	-	-	-	-	-
	Irrigation pump	2643.82	2643.82	2643.82	2643.82	2643.82	2643.82
	Depreciation	449.00	449.00	449.00	449.00	449.00	449.00
	Land revenue and irrigation cess	189.00	189.00	189.00	189.00	189.00	189.00
	Processing cost of dehusked nut in to coconut oil	-	-	-	-	14100.00	17600.00
	Amortised value of establishment cost	-	-	-	-	38434.00	38434.00
	Interest on land value (1 ha)	611734.00	611734.00	611734.00	611734.00	611734.00	611734.00
	Total of capital	24454.81	5665.06	5526.81	6006.57	63587.75	67560.25
Output	**For one Hectare (in Rs.)**						
	Coconut oil	-	-	-	-	172840.00	230503.00
	Coconut husk	-	-	-	-	7350.00	9800.00
	coconut shell	-	-	-	-	5250.00	7000.00
	Oil cake	-	-	-	-	17128.80	22865.85
	Total return	**-**	**-**	**-**	**-**	**202568.80**	**270168.90**

APPENDIX V

Details of costs and Returns from coconut (Social Price)

		1'st year	2'nd year	3'rd year	4th -7th year	8th-15th year	16th year onwards
Inputs	**Tradables (Rs/Ha)**	-	-	-	-	-	-
	Non tradables (Rs/Ha)						
	Seedlings	17725.75	911.61	-	-	-	-
	Lime	1122.63	1122.63	1122.63	1347.15	2245.25	2245.25
	Farm yard manure	8846.25	8846.25	8846.25	11795.00	20641.25	20641.25
	Other fertilisers	2836.50	4973.33	4973.33	6618.50	11119.08	11119.08
	Plant protection chemicals	-	-	-	2625.00	2625.00	2625.00
	Electricity	300.00	300.00	300.00	300.00	300.00	300.00
	Fuel (litres)	-	-	-	-	-	-
	Total input cost	30831.13	16153.82	15242.21	22685.65	36930.58	36930.58
Factors	**Labour (Rs/ha)**						
	Land preparation	1950.00	-	-	-	-	-
	Digging, filling and planting	15600.00	1300.00	-	-	-	-
	Manure and fertilizer application	3900.00	3900.00	3900.00	5200.00	13650.00	13650.00
	Intercultural operations	3250.00	3250.00	3250.00	3250.00	8450.00	8450.00
	Crown cleaning and pesticide applications	-	-	-	2600.00	3900.00	3900.00
	Irrigation	11050.00	9750.00	9750.00	6500.00	6500.00	6500.00
	Harvesting	-	-	-	-	22100.00	22100.00
	Collection and handling	-	-	-	-	3900.00	5200.00
	Dehusking	-	-	-	-	6500.00	8450.00
	Total labour cost (Rs/ha)	48290.00	24584.00	22828.00	23706.00	87800.00	92190.00

APPENDIX V (Continued)

		1'st year	2'nd year	3'rd year	4th -7th year	8th-15th year	16th year onwards
	Capital (Rs/ha)						
	Interest on working capital (12%)	9571.09	4965.09	4644.98	5643.55	16736.23	17683.03
	Interest on fixed capital (12%)	2117.25	317.25	317.25	317.25	317.25	317.25
	Tractor services including fuel charges	15000.00	-	-	-	-	-
	Irrigation pump	2643.82	2643.82	2643.82	2643.82	2643.82	2643.82
	Depreciation	449.00	449.00	449.00	449.00	449.00	449.00
	Land revenue and irrigation cess	189.00	189.00	189.00	189.00	189.00	189.00
	Processing cost of dehusked nut in to coconut oil	-	-	-	-	14100.00	17600.00
	Amortised value of establishment cost	-	-	-	-	46955	46955
	Interest on land value (1 ha)	611734.00	611734.00	611734.00	611734.00	611734.00	611734.00
	Total of capital	29970.18	8564.18	8244.07	9242.64	81390.32	85837.12
Output	For one hectare (in Rs.)						
	Coconut oil	-	-	-	-	117160.00	156247.00
	Coconut husk	-	-	-	-	7350.00	9800.00
	Coconut shell	-	-	-	-	5250.00	7000.00
	Oil cake	-	-	-	-	17128.00	22865.85
	Total return					146888.00	195912.90

APPENDIX VI

Marketing cost of coconut in Thiruvananthapuram district (Rs./kg)

Market functionaries	Items	Channel I	Channel II	Channel III
	Dehusking	1.60	-	-
	Loading and unloading	-	-	-
	Transportation	-	-	-
	Processing cost	-	-	-
	Storage	0.50	-	-
Farmer	Total marketing cost	2.10	-	-
	Dehusking charges	-	1.60	1.60
	Loading and unloading	-	0.10	0.10
	Transportation	-	0.25	0.25
	Storage	-	0.50	0.50
Village trader	Total marketing cost	-	2.45	2.45
	Loading and unloading	-	-	-
	Transportation	-	-	-
	Storage and other costs	-	-	0.50
Retailers	Total marketing cost	-	-	0.50
Total marketing cost		**2.10**	**2.45**	**2.95**

APPENDIX VII

Marketing cost of coconut in Thrissur district (Rs./kg)

Market functionaries	Items	Channel I	Channel II	Channel III	Channel IV
	Dehusking	-	-	-	-
	Loading and unloading	-	-	-	-
	Transportation	-	-	-	-
	Processing cost	-	-	-	-
	Storage	-	-	-	-
Farmer	Total marketing cost	-	-	-	-
	Dehusking charges	1.60	1.6	-	-
	Loading and unloading	0.35	0.20	-	-
	Transportation	0.50	0.35	-	-
	Storage	0.90	-	-	-
Village trader	Total marketing cost	3.35	2.15	-	-
	Dehusking charges	-	-	1.60	-
	Loading and unloading	-	0.20	0.20	-
	Transportation	-	0.50	0.50	-
	Storage	-	0.90	0.90	-
	Processing cost	-	1.75	1.75	-
Copra makers	Total marketing cost	-	3.35	4.95	-
	Loading and unloading	-	0.25	0.25	-
	Transportation	-	0.50	0.50	-
	Storage	-	0.75	0.75	-
	Processing, packaging and other cost	-	2.50	2.50	-
Oil millers	Total marketing cost	-	4.00	4.00	
	Dehusking	-	-	-	1.6
	Loading and unloading	-	-	-	0.20
	Transportation	-	-	-	0.35
	Storage	-	-	-	0.75
Private CPC	Processing, packaging and other cost	-	-	-	4.00
	Total marketing cost	-	-	-	6.90
	Loading and unloading	-	-	-	
	Transportation	-	-	-	
	Storage and other costs	0.50	0.50	0.50	0.50
Retailers	Total marketing cost	0.50	0.50	0.50	0.50
Total marketing cost		**3.85**	**10.00**	**9.45**	**7.40**

APPENDIX VIII

Marketing cost of coconut in Kozhikode district (Rs./kg)

Market functionaries	Items	Channel I	Channel II	Channel III	Channel IV
Farmer	Dehusking	1.20	-	1.20	1.20
	Loading and unloading	0.20	-	0.20	0.25
	Transportation	0.35	-	0.35	0.35
	Processing cost	-	-	-	1.50
	Storage	-	-	-	0.90
	Total marketing cost	1.75	-	1.75	4.20
Village trader	Loading and unloading	0.25	-	-	-
	Transportation	-	-	-	-
	Storage	0.25	-	0.25	-
	Total marketing cost	0.50	-	0.25	-
Agent	Loading and unloading	0.25	-	-	-
	Transportation	0.50	-	-	-
	Storage	-	-	-	-
	Total marketing cost	0.75	-	-	-
Copra makers	Loading and unloading	0.15	0.50	-	-
	Transportation	0.20	0.70	-	-
	Storage	0.50	0.90	-	-
	Processing cost	1.25	1.75	-	-
	Total marketing cost	2.10	3.85	-	-
Oil millers	Loading and unloading	0.25	0.25	-	0.25
	Transportation	0.75	0.50	-	0.50
	Storage	-	-	-	
	Processing, packaging and other cost	1.75	2.50	-	2.50
	Total marketing cost	2.75	3.25	0.00	3.25
Wholesalers	Loading and unloading	0.20	0.20	-	0.20
	Transportation	0.35	0.35	-	0.35
	Storage	0.25	0.25	-	0.25
	Packaging and other cost	0.75	0.75	-	0.75
	Total marketing cost	1.55	1.55	-	1.55
Retailers	Loading and unloading	-	-	-	
	Transportation	-	-	-	
	Storage	0.25	0.25	-	0.25
	Total marketing cost	0.25	0.25	0.00	0.25
Total marketing cost		**9.65**	**8.90**	**2.00**	**9.25**

DYNAMICS AND COMPETITIVENESS OF AGRICULTURAL TRADE POLICIES ON COCONUT ECONOMY OF KERALA

By
THASNIMOL F
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ABSTRACT

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Faculty of Agriculture

Kerala Agricultural University

Department of Agricultural Economics
COLLEGE OF HORTICULTURE
VELLANIKKARA, THRISSUR – 680656
KERALA, INDIA
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ABSTRACT

Coconut is a crop of economic importance in many Asian and Pacific countries. India is the largest producer of coconut in the world contributing 23798.23 million nuts from an area of 2.09 million ha (CDB, 2018). The economic reforms of the 1990s and the subsequent trade liberalization policies have brought challenges and prospects to Indian agriculture including the coconut industry. In this context, the present study was undertaken with the objectives to trace and assess the impact of trade policies in edible oil on coconut economy of Kerala, to analyse the price transmission in the markets, to estimate the efficiency of selected coconut markets and finally to suggest appropriate policy measures for improving the performance of coconut trade.

Both primary and secondary data were used for examining the specific objectives of the study. The primary data were collected using well-structured and pretested schedules through a survey of 90 farmers, 45 market intermediaries and 15 exporters in the selected districts of Kerala. Secondary data was mainly collected from authentic sources like CDB, EXIM data bank, DGCI&S, DGFT and FAO statistics.

Though trade liberalization adversely affected the coconut farmers during the initial phase of liberalization, it subsequently increased the opportunities of the Indian coconut sector to compete in the world market. The export growth rate of coconut products has increased during the study period (1980-81 to 2016-17) while instability index, a measure of export stability was found to have decreased. The high growth rates of coconut products together with low instability indices in the export revealed the prospects for Indian coconut sector in the global market. Hence stream lining the production through Good Agricultural Practices to fulfill the export market requirements with regard to quality and safety would boost the trade.

The comparative advantage in coconut trade analysed using the Revealed Symmetric Comparative Advantage (RSCA) indicated that coconut oil and desiccated coconut did not possess any comparative advantage in global trade, while coconut (fresh and dried) and copra have comparative advantage. It was obvious from the result that rather than focusing on the export of coconut oil and desiccated coconut, India must give much effort to increase our export share of coconut, copra and other value-added coconut products to augment the foreign earnings.

The trade policies concerning edible oils at the national level were found to have an impact on the coconut oil prices in Kerala too. Exponential growth rates were computed to compare the growth of edible oil imports and coconut oil prices in Kerala. The significant improvement in the growth rates of edible oil import and decline in the growth rates of coconut oil price confirmed that trade liberalisation and further Free Trade Agreements (FTAs) facilitated the huge import of edible oil from other countries which unfavorably affected the domestic coconut economy.

The result of the Policy Analysis Matrix (PAM) unveiled that coconut oil production in Kerala was competitive at the given level of technologies, prices of inputs and outputs and current policy stipulations. However, social profitability, a measure of efficiency or comparative advantage was observed to be negative. The result depicted that coconut oil production in Kerala lacks comparative advantage in production and the state was not able to use the available resources efficiently.

The efficiency of selected coconut markets studied using Shepherd's index indicated that the presence of more number of marketing intermediaries and high marketing cost and margin have reduced the producer's share in consumer's rupee. Besides, high wage rates, shortage of skilled labour, lack of processing technologies, adverse climatic conditions, etc., obstruct the farmers in performing even the primary level processing and thereby it reduces the producer's share in consumer's rupee.

The cointegration analysis using Johansen Cointegration method revealed that the liberalisation policies and further free trade agreements have resulted in the transmission of price signals between domestic and international edible oil markets and it led to the integration of these markets during the post-liberalisation period. The result of Vector Error Correction Model (VECM) also depicted that changes in the international prices of edible oils would cause changes in price in the domestic coconut oil market in the long-run.

High wage rate, labour shortage and incidence of pest and diseases were the major production constraints faced by the farmers. Inclusion of agricultural operations also under MGNREGA has been suggested by farmers as an option for bringing down the cost of cultivation. Shortage of skilled labours can be lessened through the adoption of programmes like Friends of Coconut Tree (FoCT). The problems related to pest and disease attacks can be addressed by developing resistant and hybrid varieties and better plant protection measures.

Price fluctuation, high transportation cost, inadequate storage and processing facilities were the major marketing constraints faced by the farmers. Long-term policies for the price stabilization of coconut and other coconut products are inevitable to reduce the price fluctuation. The government should continue the procurement operation through Krishi Bhavans as it is found to be beneficial for the farmers. Shortage of raw nuts, lack of exclusive market for coconut and high domestic price were the major constraints reported by the domestic traders and upcountry traders. The recent surge in the domestic price could be attributed mainly to the short supply coupled with high domestic and industrial demand. Shortage of raw nut due to lower production, productivity and pests and diseases needs to be addressed seriously.

In the era of trade liberalisation and FTAs, the interests of farmers also need to be safeguarded while concentrating on trade opportunities. Given the present trade scenario, the coconut sector in Kerala needs strong support from the government to revive and retrieve its premier role performed in the past.