8.1 Summary

Traditionally agricultural sector has been playing a key role in the composition of Indian exports. Apart from earning valuable foreign exchange, agricultural exports also play a significant role in employment generation both directly and indirectly in rural areas, thus contributing to increase in incomes of small and marginal farmers and landless labour. Spices are an important component of Indian agriculture trade portfolio with a weight of about 8 per cent. India exports spices from times immemorial and for a very long time has been among the leading spice exporting countries of the world. Today, India is the largest producer, consumer and exporter of spices in the world.

In the context of Economic Liberalisation in India and the operationalisation of WTO at the global level, Indian agricultural exports in general and spices exports in particular are facing a number of challenges. Despite these challenges Indian spices earned $1 billion export revenue during the year 2007-08. Given the traditional comparative advantages of Indian spices sector, it is recognized as one of the areas where there is tremendous potential for growth in the coming years. Hence, India is aiming to become a global processing hub of spices and planning to set up 6 to 7 Spice Parks in major growing centers and targeting at a foreign exchange earning of $10 billion by the year 2017. To achieve this ambitious objective a well coordinated Export Growth Strategy is imperative.
Formulation of a well coordinated export growth strategy for spices needs an examination of various issues related to spices exports. Specifically, the issues of growth and instability, determinants of export performance and causes and consequence of export instability are pertinent. The present study is an attempt in this direction. Of the 50 varieties of spices in whole form and around 80 varieties in value-added form being exported from India, 95 per cent of the export revenue is received from just 14 spice items, namely, pepper, cardamom (small), cardamom (large), chilli, cumin, coriander, celery, fennel, fenugreek, ginger, garlic, mint, spice oils and oleoresins, curry powders. Therefore our study was confined to these fourteen items. The specific objectives of the study were,

1. To examine the trends in growth and instability of Indian spices exports.

2. To identify the major factors determining the exports of spices from India by estimating export functions for two prominent spice commodities.

3. To determine the significant factors those are causing instability in spice exports from India.

4. To suggest an export growth strategy aimed at realizing the objective of achieving $10 billion revenue from spices exports by the year 2017.

5. To avoid spurious regression by tackling the non-stationarity problem associated with time—series data.
The study was exclusively based on secondary time series data obtained from different sources like Spices Board, DGCIS, RBI, Economic Surveys, International Financial Statistics, Direction of Trade Statistics, etc. The entire study period is divided into two, from 1960-61 to 1990-91 and from 1991-92 to 2007-08 to gauge the impact of Economic Reforms on spices exports. Due to data limitations the analysis of determinants of export performance and causes of export instability is confined to 1970-71 to 2007-08. The scope of the study of determinants of export performance is confined to two major spice exports: pepper and chilli.

Based on the above objectives, the following hypotheses have been formulated for the study:

1. Indian spices exports are experiencing high levels of instability.
2. Commodity concentration of Indian spices exports has a positive impact on export instability.
3. Geographical concentration of Indian spices exports is directly related to export instability.
4. Instability in Pepper's exports is causing instability in total spices export earnings.
5. Instability in total output of spices has a direct impact on instability of spices exports.
6. Relative price of exports is expected to have a positive influence on spice exports.
7. Domestic demand will have an adverse impact on exports.
8. Increase in domestic production of spices influences their exports positively.
9. World output of spices has a negative impact on Indian spices exports.
8.1.1 Research Methodology

Trends in growth and instability of total spices exports and its 14 major constituent commodity groups were analyzed in terms of trend growth rates and instability indices. The compound growth rates and export instability indices of value/volume/unit price of various spice items were obtained by fitting exponential trend equation as it is proved to be the best fit to the data. Before calculating compound growth rates and instability indices the time series data of each spice item under study was smoothened by using first order exponential smoothing model to remove certain extreme values. Export instability in this study is defined as the fluctuations around the estimated exponential time trend path and is measured as the standard error of the estimate. Year to year instability in exports is measured as the average percentage deviations of the observed values of export proceed from an exponential trend growth path.

To identify changes in growth and instability the study period (1960-61 to 2007-08) is split as sub-period I (1960-'61 to 1991-'92) and sub-period II (1992-93 to 2007-08), which broadly corresponds to the pre and post Economic Reforms period respectively. Trend equations were obtained for the whole period as well as for the two sub-periods. To detect the possibility of structural changes in the wake of Economic Reforms initiated during the year (1991-'92), the Chow’s Structural Break test is carried out for the trend equations belonging to the whole period. Goldfeld-Quandt test is used to verify the Homoscedasticity assumption of the Chow’s test.

As instability in export value could be partly due to instability in export volume and partly due to instability in export prices, Spearman’s rank correlation coefficient is
worked out between value instability and price/volume instability to assess the relative strength of each of them. Then, to ascertain the dominant source of instability the export volume deviations from trend of each spice commodity were regressed against the product's world unit price deviations from trend. Based on the sign of the estimated regression coefficient, inferences were made. Next the nature of inter relationship between growth and instability of various spice items is also analyzed with the help of rank correlation coefficient. Finally Indian spices exports and it's constituent commodity groups were classified into a four-fold typology based on variations in compound growth rates and instability indices and then commodity specific export strategies are identified.

In order to understand clearly the nature of inter-relationship between the causes of export instability and measure of instability, Multiple Linear Regression Analysis is done within a cointegration framework. Cointegration framework is warranted to handle the problem of non-stationarity associated with the time series data which may lead to spurious regression. The Error Correction Mechanism (ECM) is utilized to reconcile the short run behaviour of determinants of instability with their long run behaviour.

To identify the determinants of Indian spices exports, the well known Imperfect Substitutes Model of Trade Framework is considered. Based on this theoretical framework an export supply function is specified and is first estimated by OLS and where there is evidence of serially correlated errors, the Cochrane-Orcutt Iterative technique incorporating the Prais-Winsten transformation for the first observation was adopted. The errors are tested for normality and stationarity validating the tests of significance and
the estimates. This analysis is confined to two major Indian spices exports only, namely pepper and chilli.

Finally, the analysis of trends in growth and instability of exports, sources of instability in exports and determinants of exports of prominent Indian spices and its constituent commodity groups were utilized to draw some general conclusions and suggest an export strategy which may help in the realization of the stated objective. To derive an Optimum Trade Portfolio for Indian Spices, the Mean Variance Optimisation technique is being utilized. A detailed discussion of the above mentioned methodological issues and various statistical techniques used in the present study were presented in the relevant chapters.

8.1.2 Chapter Scheme

The present study is structured in eight chapters. Chapter I presents introduction and statement of the problem, significance and objectives of the study and the research methodology. The chapter also contains a description of various structural dimensions of Indian Economy, hypotheses for the study and the limitations of the study. Chapter II is a select review of literature related to trade modeling and determinants of Indian exports in general and agricultural exports in particular. The chapter also contains a review of various studies on export instability both for India and for other countries. Chapter III contains a detailed description of world spice trade and the various aspects of Indian spices sector. An analysis of growth and instability of total spice exports and its constituent commodity groups was furnished in Chapter IV. An attempt is made to develop concentration measures for Indian Spices Exports and to identify the various sources of instability of Indian spices exports in Chapter V. A time series analysis of the
determinants of two of the major Indian spices exports, namely, pepper and chilli was presented in Chapter VI. The core area of the study is Chapter VII which proposes an export strategy for Indian spices aimed at achieving a target growth rate of 20 per cent per annum in export revenue with minimum instability. The summary, findings, conclusions and suggestions originated from the study are given in Chapter VIII.

8.1.3 Review of Literature

A wide range of empirical literature is available in the areas of determinants of exports and export instability. However there are only limited numbers of studies with reference to Indian spices exports. On the whole, the empirical literature on determinants of exports is characterized by two general models: the imperfect substitutes model and the perfect substitutes model. The fundamental assumption underlying the imperfect substitutes model is that neither the imports nor the exports are perfect substitutes for the domestic products. Perfect substitutes model on the other hand, assumes perfect substitutability between domestic and foreign goods. An overwhelming majority of empirical studies are based on the imperfect substitutes model, because there is ample empirical support for it. These studies tried to gauge the determinants of exports mostly at aggregate level and occasionally at individual sector or industry level.

The major determinants of quantum of exports according these studies from the demand side are real income of trading partners which has a positive impact, the relative price (ratio of export price to competitor’s price) which has a negative impact and real effective exchange rate having a negative impact. The supply of exports is determined positively by relative price (ratio of domestic price to export price) and domestic output.
and negatively by domestic demand pressure. Studies specifically with reference to developing countries included supply side shocks in their models. Coming to econometric methodology of these studies, most of them estimated either export demand or export supply function by single equation methods even though the relationship between quantities and prices is at least in theory simultaneous. Thus, the results of these studies may be subject to simultaneous equation bias as pointed out by Orcutt (1950). In the context of recent developments in time-series econometrics most of the contemporary empirical studies adopted cointegration framework to avoid the problem of spurious regression. Further majority of the studies that are reviewed above used a static framework. On the whole estimation results of the these studies indicate that while developing countries show in general, lower price elasticities than industrial countries, Asian countries have significantly higher price elasticities than other developing countries. Furthermore, Asian countries benefit from higher income elasticities than the rest of the world, confirming the general view that trade has been a powerful engine of growth in the region. Africa in contrast faces the lowest income and price elasticities.

Empirical Studies on determinants of Indian exports have also generally adopted the imperfect substitution model framework with emphasis on supply side factors because it is believed that Indian exports performance is fundamentally supply constrained. Estimation results of these studies reveal that Indian exports are generally price and income inelastic and the impact of exchange rate on them is inconclusive. However, domestic capacity and domestic demand are found to have strong impact on their performance, especially for agricultural exports. Studies on spices exports, though very limited, yielded similar results. Regarding empirical methodology of these studies, failure
to address the issue of stationarity of the data makes the statistical significance of the estimates skeptical. Some of the recent studies however tried to overcome this problem by adopting the cointegration framework but the estimation results of these studies are not much different from the earlier ones.

The review of various empirical studies on the determinants of export instability reveal that commodity concentration, geographical concentration, the ratio of food and raw materials to total exports, per capita income of the exporting country, openness of the economy and export shares in world trade are the commonly hypothesized determinants. Some recent studies extended this list by including factors like, the relative importance of major commodity, global demand conditions influencing the major commodity, internal supply conditions, etc. Further, some researchers objected the instability analysis at aggregate level as it fails to address the characteristics of individual commodities and degree of development of the exporting country. However, the empirical evidence on the relationship between the above listed determinants and export insatiability is inconclusive. This could be due to the fact that there is no-a priory theoretical foundation for the link between export instability and its alleged determinants and it seems that these empirically plausible propositions needs to be empirically verified in different situations.

Also, almost all previous studies on export instability rely on cross section data. One general problem with cross section data is that the studies using such a data estimate average relationships and does not provide much information on the specific countries and commodities. Even though some studies use time series data, they did not address the issues of non stationarity of data and may have estimated spurious regression. Studies that
accounted for non stationarity of data are very few and they also do not reveal definite causal relationship between export instability and its various determinants.

Studies on the determinants of export instability related to Indian exports are very few and are mostly at aggregate level. Some of these studies found export concentration as a determinant of export instability. Regarding instability of agricultural exports most of the studies identified supply side factors as more important than demand factors. However, all these studies are based on time series data and without consideration for non stationarity issue the results of the studies may not be reliable.

8.1.4 Theoretical Frame Work of the Study

I. Determinants of Spices Exports

On the basis of conventional trade theory, export performance of a commodity is influenced by both foreign demand and domestic supply factors and therefore export demand and export supply functions can be specified and estimated to identify the determinants of exports. Although an appropriate answer to the question of how these functions should be specified depends on a number of factors, among which according to Goldstein and Khan (1985, p.1044), the most important include, the type of good being traded, its final use, institutional framework under which it is traded, purpose of modeling exercise and the availability of data. Trade Theory suggests two basic models: Model of imperfect substitutes and Model of perfect substitutes: The fundamental assumption underlying the imperfect substitutes model is that neither the imports nor the exports are perfect substitutes for the domestic products. Perfect substitutes model on the other hand,
assumes perfect substitutability between domestic and foreign goods and is typically used in case of homogeneous goods. Since, under the key assumption of perfect substitutes model each country would be only an exporter or an importer of a traded good and not both, which is not observed in real world this model has attracted much less attention in the empirical literature than the imperfect substitutes model.

The present study adopted the imperfect substitutes model of trade as the theoretical basis for specifying and estimating the determinants of two major Indian spices exports: pepper and chilly. This model is based on the following assumptions.

1. There are two countries, the home country (which is small and open) and the foreign country (the rest of the world).

2. Exports are not perfect substitutes for domestic goods in the importing countries. Consumers in the importing countries differentiate between domestically produced and imported variants of the goods. That is, consumers prefer product variety.

3. Profit maximizing producers operating under conditions of constant or diminishing returns to scale responds to changes in export prices in the exporting country

4. Consumers in the importing countries maximizes their utility by consuming a variety of products (Imperfect substitutes), subject to their budget constraint.

5. Perfect competition prevails in all markets.
6. Exports are not inferior goods.

7. The demand and supply functions are homogeneous of degree zero in prices.

The fundamental assumption underlying the imperfect substitutes model is that neither the imports nor the exports are perfect substitutes for the domestic products. Such a hypothesis is confirmed by empirical evidence. If domestic and foreign goods were perfect substitutes and produced under constant are decreasing costs, countries would specialize and there would be no intra-industry trade and a given country would be either an exporter or importer (Magee and Houthakkar, 1969). Further Goldstein and Khan have shown that except for the standard commodity products (such as wheat, copper) the law of one price as predicted by the perfect substitutes model doesn’t holds good. Thus there is a possibility to estimate finite price elasticities for most traded goods. Thus, the imperfect substitutes model of home country’s exports to the rest of the world can be formalized by the following equations with expected signs given in the parenthesis.

\[
X_d = F(Y_w, P_x, P_w) \quad (+) \quad (-) \quad (+) \quad (1)
\]

\[
X_s = F(P_x, P_d) \quad (+) \quad (-) \quad (2)
\]

\[
X_d = X_s \quad (3)
\]

Where,

- \( X_d = \) export demand, \( X_s = \) export supply.
- \( P_x = \) export price, \( P_w = \) average price of competing commodities.
- \( Y_w = \) weighted average of the incomes of countries trading partners,
- \( P_d = \) domestic price of exports.
In the above model, export demand is hypothesized to vary positively with world income, inversely with export price and positively with export price of competing commodities (eqn—(1)). While export supply is expected to have positive link with export price and a negative link with domestic price of exports (eqn—(2)). The equilibrium condition is represented by the third equation. The implicit hypothesis is that prices move in order to equate export demand ($X_d$) with export supply ($X_s$) over time.

II. Determinants of Export Instability of Spices

We know that export revenue is the product of export volume and export price. Therefore, export instability defined as the instability in export revenue could be partly due to instability in the export prices and partly due to instability in export quantities. These fluctuations in price and volumes do not arise randomly but reflect underlying changes in demand and supply conditions and their respective elasticities. The supply conditions are generally influenced by domestic factors, whereas the demand conditions are influenced by international factors. Apart from supply and demand factors, export instability may be affected by trade policies of the trading partners, rules of trading system, market imperfections etc.

It is often postulated that countries having large product concentration in their export basket (commodity concentration) experience large export instability because concentration on a few commodities reduces the chances of having fluctuations in one direction in some of its exports offset or ameliorated by counter fluctuations or stability in others. An analogous argument is made with respect to geographical concentration.
For example Massell argues that high geographical concentration is likely to imply greater dependence on economic conditions in one or few countries. Fluctuations in demand in any recipient country will then have a more pronounced effect on the receipts of the exporting country than if receipts were more diversified among recipients. From these arguments it is clear that export instability can be reduced by product diversification and geographical diversification. However, there is no- a priory theoretical foundation for this kind of relationship between diversification and instability and it needs to be empirically verified in different situations.

8.1.5 World Spice Trade Scenario

The current world spice trade scenario brings out the following trends:

1. The world spice trade during the year 2005 is about 1.63 million tons valued at US $3 billion. This is against the world production of 8.5 million tons valued at US $ 25 billion. The trade is growing at a rate of 7% per annum in volume.

2. Developing countries like China, India, Madagascar, Indonesia, Vietnam, Brazil, Guatemala etc supply nearly 55% of spices to global markets. The USA, the EU, Japan and Singapore are among the major markets accounting for about 64 per cent of the world import share of spices. Germany, Netherlands and Singapore are the prominent re exporters in spices trade.

3. The prominent spices in international markets are pepper, capsicum, vanilla, ginger, clove and cinnamon which together constitute nearly 70 per cent of world spice trade by value. The prices of pepper and vanilla generally determines the
value growth of world spice trade, whereas volume growth depends on capsicum and seed spices.

4. The trends in prices of major spices in the international markets are determined by supply and demand factors and also by climatic conditions. With the emergence of WTO new players entered into the market on the supply side, thus leading to over supply in spices like pepper and cardamom which lead to dramatic decline in their prices. Pepper, the king of spices, is gradually loosing its prominence.

5. Demand for processed and value added spices is growing and they are also fetching better prices. The changing dietary pattern towards natural products in the West brings hopes of future growth prospects for spices. However, spice exporting countries are facing challenges on quality issues and food safety regulations of importing countries. The future of spice trade depends on shift towards value added products and quality consciousness on the part of exporters.

8.1.6 Summary of Indian Spices Economy

1. India has been known from prehistoric times as the land of spices. At present India is the largest producer, consumer, and second largest exporter of spices in the world. Out of the 109 spices listed by ISO, India produces as many as 75 in it's various agro-climatic regions. The area under spices cultivation is about 2.57 million hectares with an estimated production of 3.81 million tones in 2006-07. The estimated domestic retail market value of spices is around US $ 4 billion during that year.
2. Almost every State and Union Territory grows one spice or the other, be it of tropical, subtropical or temperate nature, because of the prevalence of these climatic conditions in one or other state/zone. The most important spice growing states are Rajasthan, Uttar Pradesh, Bihar, Gujarat, Madhya Pradesh, Kerala, Karnataka, A.P, Tamilnadu. Spice cultivation in India, as much of the agriculture in the country is undertaken by millions of tiny holdings and determines the livelihood of large number of rural population.

3. India today produces a wide range of spices. These can broadly be divided into five categories viz. (i) Major Spices: black pepper, cardamoms (small & large), chillies, ginger, and turmeric, (ii) Seed Spices: coriander, celery, fennel, fenugreek, dill, aniseed, caraway, mustard, poppy seed, parsley and ajowan, (iii) Tree Spices: clove, nutmeg and mace, cinnamon, tejpat, kokum, allspice, cambodge, tamarind, cassia, curry leaf, asafetida, and pomegranate; (iv) Herbal Spices: thyme, marjoram, oregano, savory, basil, rosemary, horse radish, tarragon, hyssop and lovage; and (v) Misc. Spices: garlic, saffron, vanilla, curry powder, spice oils, oleoresins and mixtures where spice content is predominant. Among the spices, chilli contributed 35% of the total quantity followed by seed spices (19%), turmeric (15%), tree spices (6%), black pepper (5%), ginger (2%) and cardamom (1%) during 2005-06

4. Though India is the homeland for many spices, productivity level attained in most spices is very low, when compared to other competing countries. This low productivity led to consequent low production and productivity inefficiency for
India in the world market for spices. Some of the constraints leading to poor productivity level are, small land holdings, lack of knowledge of high yielding varieties in spices, ravages due to pests and diseases, scientific post harvest technology and processing and storage, lack of credit facilities, failure to transfer the technology from lab to land etc.

8.1.7 Summary of Indian Spices Exports Scenario

1. India exports spices from times immemorial and for a very long time has been among the leading spice exporting countries of the world. India's annual exports of spices are about 0.3 to 0.4 million tons valued around US $ 600 to 700 million. On average India exports 7 to 8 per cent of its spices production to 130 countries but 80 % of the export revenue is received from just 20 countries. During the financial year 2007-08 India achieved for the first time export revenue of nearly US $1 billion by exporting 0.44 million tons of spices, registering an annual growth rate of 24 %.

2. The Indian spice export basket consists of around 50 spices in whole form and more than 80 products in value added form. However, a few spices and value added forms constitute a major segment of the country's total spice export earnings. The major spices exported are, pepper, chilli, mint, cumin, turmeric, coriander, cardamom, ginger. The major value added forms exported are spice oils and oleo resins, curry powders and mixers and specialty extracts and blends. At present 33% of the total exports by value are value added forms. The principal markets for Indian spices are US, EU, Japan, Malaysia, China, Singapore, UAE, Srilanka, South Africa, Kuwait.
3. Among the various spice exports maximum share for volume was from chilli (47 %), followed by turmeric (11 %), pepper (7.8 %), cumin (6.3 %), coriander (5.8 %), mint (4.7 %), curry powders (2.5 %) cardamom (2.3 %). However, in terms of value mint products (28.9 %) contributed the highest followed by chilli (24.7 %), oils and oleoresins (12.7 %), cumin (6.5 %). Chilli, pepper, turmeric constitute nearly two thirds of our spice exports by volume, where as chilli, mint and oils & oleoresins have similar contribution by value.

4. Given that India is the largest consumer of spices in the world, domestic market plays a vital role in its spices exports. In fact some consider spices export as a residual activity, i.e., as a means to dispose of excess domestic production over domestic consumption. With a rapid growth in population and rising standards of living, domestic demand for spices is expected to shoot up in the coming years and the future of spices exports depend critically on enhancing productivity levels of spices.

5. A clear trend in spices exports over the years has been high concentration in few commodities and few markets and the decline in the importance of traditional items and a substantial increase in the importance of non-traditional items.

6. With the emergence of WTO, Spice trade is influenced by various international agreements like, the Agreement on Agriculture (AoA), the Agreement on Sanitary and Phytosanitary (SPS) Measures, the Technical Barriers to Trade
(TBT) Agreement, TRIPS, Safeguards and Subsidies and Countervailing Measures (SCM) which have serious implications on spices trade.

8.2 Findings

The various findings made on the trends in growth and instability of spices exports, determinants of spices exports and sources of instability in spices export are presented in this part.

8.2.1 Trends in Growth and Instability of Indian Spices Exports

On analyzing the trends in growth and instability of Indian spices exports during the period 1960-2007, the following findings were made:

1. During the study period, 1960-2007, Indian spices exports grew at a faster rate and displayed more instability compared to total agricultural exports both in terms of volume and value. As instability is a major constraint for attaining the path of stable and sustained growth, stabilization of exports is critical for achieving an annual growth rate of 20 per cent, which can lead to achieving the target of $10 billion revenue from spice exports by 2017.

2. The growth performance of total spices exports improved significantly during the post-reforms period (1991-2007) compared to pre-reforms period (1960-1990) both for value and volume. However, no such improvement is visible in case of export unit price. Traditional exports like pepper, cardamom and ginger lost their prominence as their growth rates decelerated considerably.
which lead to a rapid decline in their share in total spices exports from about 53 per cent in 1990-91 to about 14 per cent in 2007-08. However, chilli, a traditional item of export recorded high growth rates and doubled its share from about 12 per cent in 1990-91 to 24.7 per cent in 2007-08. The main reason for decline in prominence of pepper and cardamom is the competition from Vietnam and Guatemala. The major drivers of export growth during the post-reforms period are the value added products like mint products, spice oils and curry powders.

3. The commodity composition of Indian spice export basket has witnessed structural change during the post-reforms period. From a supplier of bulk spices, today India's spice exports mainly consists of value added spice products (44 per cent). This structural change in the commodity composition is in tune with the developments in world spice markets where demand for value added spice products is increasing rapidly and their unit price realization is better compared to bulk spices. Thus future growth of Indian spices exports mainly depends on value added products.

4. During the study period, 1960-2007 the value and volume growth rates and instability indices of various spice export items shows that their frequency distribution is skewed to the higher range. That is, majority of the spice export items fall under the category of high growth and high instability. These products have bright prospects for future growth but the risk of high instability will be a major constraint on their capacity expansion. Regarding growth and
instability of export unit price, the frequency distribution of various spice items is highly symmetrical. Thus the need for price stabilization schemes seems to be very limited.

5. The instability in export earnings for individual spice items was much higher than that of total spices exports during all the periods under consideration. This phenomenon of low instability and for total spices exports and high volatility for its constituent commodity groups shows that the diversification in spices exports has strong stabilization effect on the total spices export earnings.

6. The pre-reforms period (1960-1990) growth rates of total spices exports and it’s constituent commodity groups are much lower where as instability levels are higher compared to either the whole period or the post-reforms period. However, unit price growth rates and instability levels during this period are similar to the total period.

7. Post-reforms period (1991-2007) witnessed faster growth rates and lower instability levels for total spices exports and the various spice items both in terms of volume and value. However, growth rates and instability indices of export unit price decelerated during this period.

8. The four fold classification of various spice exports items based on value/volume growth and instability levels reveals that majority of these items fall in the category of high growth and high instability. This shows that the future growth path of Indian spice exports is highly optimistic but is also risky.
9. There is a strong association between value growth and volume growth of spices exports in all the three periods under consideration. On the other hand, the association between value growth and unit price growth is statistically significant only during the pre-reforms period. Therefore, we may conclude though tentatively that Indian spices exports earning growth rates are mainly driven by volume growth. Increasing productivity levels and exportable surpluses are thus crucial for future growth.

10. Analysis of association between value instability and volume instability for Indian spices exports shows that explanation for instability in export value is likely to be found in the volume fluctuations rather than unit price fluctuations. The sources of volume fluctuations seem to be originated from supply side as indicated by the negative correlation between volume and unit price instability indices which is also confirmed by the sign of the regression coefficient, when volume deviations from trend are regressed against unit price deviations from trend.

8.2.2 Determinants of Spices Exports

The empirical analysis of the determinants of export supply of pepper and chilli lead to the following findings:

1. The empirical results generally support the view that domestic market conditions, which determine the availability of exports such as the level of production, domestic consumption, etc, are the major determinants of Indian spices export performance during the estimation period.
2. Of all the domestic factors, the level of output is the main determinant of exports for both pepper and chilli reflecting the dominance of supply effect. The translation of output increase into the corresponding export growth of these spices is negated by domestic demand pressure and competitors efforts to raise production.

3. Estimation results indicate the inelastic nature of pepper and chilly exports, as almost all the elasticities turned out to be less than one in absolute value.

4. Export supply of pepper has almost zero price elasticity indicating that export activity of pepper may be influenced by factors that bear little relationship to the export price. Chilli exports also displayed extremely low price elasticity.

5. There is some evidence of positive impact of exogenous factors like export promotion policies, improved infrastructure, trade liberalization etc on the export performance of pepper and chilli as captured by time trend variable $T$.

8.2.3 Sources of Instability

The findings made from the empirical analysis of the relationship between instability of Indian spices exports and its various determinants are presented below:

1. There is a long run equilibrium relationship between the instability of Indian spices exports and its determinants, viz., Commodity Concentration of exports, Geographical Concentration of exports, Instability in pepper exports and Instability in spices production.
2. Commodity concentration of Indian spices exports is related directly with spices export instability.

3. Geographical concentration of Indian spices exports has a significant positive impact on its export instability.

4. Instability in production of spices is found positively related with the level of instability in exports of spices.

5. Instability in pepper exports is found not significant in explaining instability in total spices exports.

6. Instability in spices exports is sensitive and tends to depart from the equilibrium value of the previous period and the system corrects to previous period disequilibrium by 27 per cent in a year.

8. 2. 4 Results of Testing of Hypotheses

In relation to the findings of the study, the specified hypotheses have been tested and the results are as given below:

The first hypothesis that ‘Indian spices exports are experiencing high levels of instability’ is found true and accepted.

The second hypothesis that ‘Commodity Concentration of Indian spices exports has a positive impact on export instability’ is found true and accepted.
The third hypothesis that ‘Geographical Concentration of Indian spices exports is directly related to export instability’ is found true and accepted.

The fourth hypothesis that ‘Instability in pepper’s exports is causing instability in total spices export earnings’ is not found true and rejected.

The fifth hypothesis that ‘Instability in total output of spices has a direct impact on instability of spices exports’ is found true and accepted.

The sixth hypothesis that ‘Relative price of exports have a positive influence on spice exports’ requires further study for a definite conclusion.

The seventh hypothesis that ‘Domestic demand will have an adverse impact on exports’ is found true and accepted.

The eighth hypothesis that ‘Increase in domestic production of spices influences their exports positively’ is found true and accepted.

The ninth hypothesis that ‘World output of spices has a negative impact on Indian spices exports’ is found true and accepted.

8.3 Growth Strategy for Indian Spices Exports

An attempt has been made to formulate a growth strategy for Indian spices exports based on the findings and conclusions of the study. The prominent features of the current growth strategy of spices exports were discussed first. Next, the outline of the conceptual frame work of the strategy formulation process, which forms the basis for suggesting the
export growth strategy was explained. The identified twin objectives of export growth strategy for Indian spices are: achieving an annual compound growth rate of 20 per cent and stabilizing the export earnings. Next, an attempt is to identify the strengths, weaknesses, opportunities and threats of Indian spices sector, which is crucial for generating alternative strategies.

8.3.1 SWOT Analysis of Indian Spices Sector

The present status of the Indian spices exports can be understood with SWOT analysis, which forms the background for formulating an appropriate growth strategy for spices.

**Strengths:**

1. Diverse agro-climatic conditions suitable for growing all kinds of spices.
2. Availability of innumerable varieties.
3. Comparatively cheap labour.
4. A large domestic market for better buoyancy in trade.
5. Traditional brand name.
6. An acknowledged market leader in some of the spices exports
7. Availability of spice varieties which are considered the best in quality in the world.
8. Availability of trained and competent manpower for the traditional areas of research.
9. Capabilities acquired by the spice industry in the last four and half decades. in quality management, improved packaging, and technological innovations
in production and processing.

10. The Indian spice industry is blessed with strong research support and a number of high yielding varieties are available, suited to different agro-climatic factors


Weaknesses:

1. Low productivity of Indian spices.
2. High cost of production.
3. Inadequate exportable surplus
4. Dependence on few commodities and small number of markets.
5. Poor quality of spices for export
7 Lack of support price for the product
8 Poor post harvest management.
9 Branded as unreliable supplier.
10 Inadequate availability of inputs

Opportunities

1. Increasing demand for spices and its value added forms globally.
2. The trend towards internationalization and increasing consumption of ethnic foods has created growing interest in spices. A broad selection of spices can be found in today's kitchen.
3. The usage of spices and herbs by consumers is increasing because these products are appreciated as completely natural ingredients, rather than artificial additives.

4. When looking at consumption data and trends, it becomes clear that opportunities for export of spices & herbs lie in the following fields:
   - Ready-to-use segments, like pizzas, sauces and other convenience food.
   - Health food sector, for example, organic spices & herbs and herbal teas.
   - New authentic varieties of mixed spices and herbs, like pimento, chillies, allspice etc.

5. New markets based on new uses, such as application of spices in the medicinal, neutraceutical, cosmetic, pastry, etc are gradually emerging. Opportunities for product and geographical diversification of spices exports.

6. Establishment of cooperative movement to regulate production and marketing to increase competitiveness of Indian products in the international market.

7. Employment opportunities for trained manpower in spice industry and spice farming.

Threats

1. With the emergence of WTO, quantity restrictions and geographical barriers are lifted and India is facing the heat of global competition. Countries hitherto inactive in the spice trade have started emerging as producers, posing a substantial threat to traditional exporters like India. These new entrants have practically no domestic market, which compels them to push their produce at cost price or even below it.

2. Gradual erosion of price competitiveness of Indian spices in International markets.
3. Global supply of spices is growing whereas the demand is fairly static.

4. The physical condition and hygienic standards of Indian spices are far below the international standards. Export competitiveness of Indian spices could diminish either because of explicit bans or the costs of compliance with the new standards such as Sanitary and Phytosanitary Agreements.

5. The years ahead will see universalisation of the consumer and universalisation of products, forcing the producer to adopt technology and quality of global standards, failure of which detrimental to Indian spices sector.

6. Price volatility in international markets and absence of hedging mechanisms both for producers and exporters.

Based on the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of Indian spices sector and the resultant SWOT matrix three alternative growth strategies were identified of which the Moderate Risk Strategy was selected keeping in view the objectives of the strategy. This Moderate Growth Strategy consists of building an Optimized Trade Portfolio for Indian spices and formulating appropriate strategic plans to realize the same. The standard Morkowitz Portfolio Optimization Theory is applied to Indian spices trade portfolio to obtain an Optimal Trade Portfolio for Indian spices. The resultant trade portfolio clearly shows that the present trade portfolio needs diversification, both horizontal and vertical by increasing the share of value-added products from the present level of 44 per cent to about 65 per cent and by capturing new markets in the coming years.
To achieve the trade diversification it was suggested that strategic initiatives are needed in the areas of supplying adequate quantity and quality of spices, improving productivity of spice crops, de-commoditizing spices exports, widening the export basket, shifting focus to retail markets and reinventing the new discerning consumer. The need for proper implementation and monitoring of the growth strategy through empowered committees was also stressed. This export growth strategy for spices, if implemented and monitored properly is expected to achieve the stated objectives.