CHAPTER VII

GROWTH STRATEGY FOR INDIAN SPICES EXPORTS

Introduction

Indian spices are sold throughout the world and it is an industry with a very broad and historical perspective. The analysis of growth and instability of Indian spices exports and its constituent commodity groups for the study period 1960 – 2007 (Chapter IV), revealed that spices exports have bright prospects for future growth. However, export instability is a major constraint for achieving such a growth. Therefore, stabilisation of export earnings is critical for achieving long term growth in Indian spices exports. Regarding the source of instability it was found that, volatility in export volume originating from supply side is the main contributor. The empirical analysis of the determinants of two major Indian spice export items viz., Pepper and Chilli (Chapter VI) shows that domestic market conditions are the main determinants of their export performance. Similarly, cointegration analysis of the various causes of export instability of Indian spices (Chapter V) indicates that commodity concentration, geographical concentration and instability in production are the causative factors. Taking all these factors into consideration, an attempt is made in this chapter to propose a growth strategy aimed at achieving an annual export growth rate of 20 per cent and also stabilizing export earnings, which may ultimately lead to the reaching the grand goal of $10 billion revenue from spices exports by 2017.

The chapter is organized as follows: Section I consists of an outline of the current export growth strategy of Indian spices. Section II discusses the various conceptual issues
related to growth strategy and Section III proposes a growth strategy for Indian spices exports aimed to achieve a sustained growth rate of 20 per cent per annum.

Section I

7.1 Current Growth Strategy of Indian Spices Exports

Traditionally India has followed an inward looking agricultural policy aiming primarily at achieving self-sufficiency in agriculture. As a result, there was little emphasis on agricultural exports as a means of stimulating domestic production and improving balance of payment situation. In general agricultural exports reflected the “Vent for Surplus Theory”, according to which only excess supply over domestic needs could be exported. Most of the agricultural exports were subjected to export controls of one kind or the other. Exports were regulated by licenses or by various state agencies. However, spices exports are an important source of foreign exchange for India even during the colonial era and are therefore enjoyed a relatively free trade regime over the years which continued till today. The export strategy of spices over the years should be viewed from this perspective. The following are the main elements of the strategy:

1. Given that there is a vast domestic market for spices, export of spices is basically undertaken to dispose of the excess of domestic supply over domestic needs rather than as a specialized activity. That is exports of spices are mainly dependent on domestic market conditions rather than international market signals
2. Relatively open trade environment with no export controls and license requirements. However export tariffs on spices are on the higher side.

3. Tendency towards concentrating on few export items and small number of export markets. That is no deliberate policy decisions towards either commodity or geographical diversification of spices exports.

4. Setting up of government agencies for looking after various aspects of production, processing, movement, marketing, research, finance, human resources development, and quality control and export promotion.

5. Creating exports related Infrastructure facilities like post harvest handling facilities, specialized transport and storage facilities, packaging, brand publicity, pre shipment inspection, assistance in export procedures, organizing and participation in international trade fairs and exhibitions, etc.

6. To increase the production of spices special research activities/centers were initiated: The All India Coordinated Spices and Cashew Nut Improvement Project was established in 1971. Similarly, ICAR established a Regional Station of the Central Plantation Crop Research Institute at Calicut in 1975 for conducting research on crop production, protection and technological aspects of major spices. This was followed by The Indian Cardamom Research Institute in 1976 at Myladampura to conduct research especially on Cardamom. In 1995, The Indian Institute of Spices Research (IISR) was set up at Calicut, to coordinate the research activities of various regional research centers on spices. A Krishi Vigyan Kendra
has also been added in 1992 at IISR to provide skill oriented and need based training on spices for farmers. Thus number Government agencies which work in the fields of development, research and extension services for spices were established over the years.

7. The major policy decision regarding spices exports is the setting up of the Spices Board in the year 1987 under the umbrella of Ministry of Commerce and Industry Government of India as the apex body for promoting exports of Indian spices. The Board is an international link between the Indian exporters and the importers abroad.

The Spices Board has been spearheading activities for excellence of Indian spices, involving every segment of the industry. The Board has been playing an important role as development, regulatory and promotional agency for Indian spice exports. The major policy decisions of the Board over the years are:

- Spices Districts (Wynad and Idukki's in Kerala), single window system for production and marketing and concerted R&D efforts.
- Small Farmers' Agri-Business Consortium (SFABC): Production, value addition, quality maintenance and marketing on cooperative basis (one district in each state.)
- Indian spices logo and brand promotion. Maintenance and assurance on quality on quality of Indian spices through standards and specifications.
- Market interventions: to maintain prices of spices from crushing down.
- Special subsidies: promotion of export by bringing prices at par below international prices.
• Reduction in cess: reduction in cess from 2 per cent to 0.5 per cent on whole spices.
• Monitoring and coordinating body at the level of Planning Commission to coordinate spices programs under different missions.
• Technology Mission for Pepper
• Export promotion of all spices through support for technology upgradation, quality upgradation, brand promotion, research & product development.
• Promoting cultivation of Organic Spices. Extension of Spice Cultivation in Non-Traditional Areas.
• Electronic Auctioning of spices.
• Establishing Spice Parks as Production Centers for Value-added spice products

Section II

7.2 Growth Strategy: Conceptual Framework

Before suggesting an export growth strategy for Indian spices sector, the conceptual framework for strategy formulation and implementation should be known clearly. Therefore, the various conceptual issues relating to growth strategy formulation are discussed in this section.

7.2.1 What is Strategy?

The concept of strategy has been borrowed from the military and adopted for use in business and Economics. In military strategy often refers to deployment of troops. In business and Economics, strategy is associated with unified design and action for
achieving major goals, gaining command over the situation with a long-range perspective and securing a critically advantageous position. Strategy thus, forms the basis for competition for a business. This is the sense in which we are using the concept of strategy here.

7.2.2 What is Growth Strategy?

Growth strategy refers to the setting up of growth targets for the concerned variables and formulating various plans and policies and determination of a unified course of action to achieve the growth targets within a given time frame work.

7.2.3 The Process of Strategy Formulation?

The process of strategy formulation consists of a series of well connected steps. This process can be explained with the help of a diagram (Figure 7.1). From this diagram the sequence of steps in strategy formulation are listed as follows and discussed in detail later.

1. Formulation of objectives.
2. External environmental analysis. SWOT Analysis.
3. Internal environmental analysis.
4. Formulation of alternative strategies.
5. Selecting the best strategy
6. Implementation of the strategy.
7. Strategic evaluation and control.
7.2.3.1 Formulation of Objectives:

Formulation of objectives to be achieved is the first step in strategy formulation process. Objectives are the ends towards which activity is aimed. Strategy as already mentioned is the means to achieve the objectives. Objectives should not be static, they should be dynamic. Changes in business environment both internal and external may call for modification of the objectives. Formulation of specific and clear objectives helps in selecting appropriate strategy. Objectives may be of short-run or long-run nature. A short run-objective may be a means to achieve the long-run objective.
7.2.3.2 SWOT Analysis:

A scan of the internal and external environment is an important part of the strategy formulation process. Environmental factors internal to the firm/industry usually can be classified as strengths (S) or weaknesses (W) and those external to the firm/industry can be classified as opportunities (O) or threats (T). Such an analysis of environment is referred to as SWOT Analysis. Identification of the threats and opportunities in the external environment and the strengths and weaknesses of the external environment is the cornerstone of strategy formulation. It is these factors which provide information that is helpful in matching the firm/industry's resources and capabilities to the competitive environment in which it operates and determine the course/courses of action to ensure it's survival/growth. As such SWOT analysis is instrumental in strategy formulation and selection. The following Figure (7.2) shows how a SWOT analysis fits into an environmental scan.

Fig 7.2 SWOT Analysis Framework
Strengths

A firm/industry’s strengths are its resources and capabilities that can be used as a basis for developing comparative advantage in the market. These strengths are instrumental in achieving the objectives.

Weaknesses

They refer to constraints or obstacles which check the movement in certain desire direction, and may also inhibit the firm industry in gaining distinctive comparative advantage. These weaknesses hinder the achievement of objectives.

Threats:

An environmental threats are challenges posed by an unfavorable trend or development in the environment that would lead in the absence of purposeful action, to the erosion of the firm/industry’s present position and are harmful in achieving the desired objectives.

Opportunities:

Environmental opportunities is an attractive area for firm/industry’s action in which it has comparative advantage and which help in achieving its goals. These are the external conditions that are helpful in achieving the objectives.

7.2.3.3 Strategic Alternatives and Choice of Strategy

After identification of the environmental opportunities and threats and firm/industry’s the next tasks in the strategy formulation process are the consideration of strategic alternatives and the choice of the most appropriate strategy. A firm /industry should not necessarily pursue the more lucrative opportunities. Rather it may have a better chance of
developing a competitive advantage by identifying a fit between its strengths and upcoming opportunities. In some cases the firm /industry overcome a weakness in order to prepare itself to pursue a compelling opportunity. To develop strategies that take into account the SWOT profile the matrix of these factors can be constructed. The SWOT matrix is shown below.

**SWOT MATRIX**

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-O Strategies</td>
<td>W-O Strategies</td>
</tr>
<tr>
<td>Threats</td>
<td>S-T Strategies</td>
<td>W-T Strategies</td>
</tr>
</tbody>
</table>

- S-O Strategies pursue opportunities that are a good fit to the firm /industry's strengths.
- W-O Strategies overcome weaknesses to pursue opportunities.
- S-T Strategies identify ways that the firm /industry can use it's strengths to reduce vulnerability to external threats.
- W-T Strategies establish a defense plan to prevent firm /industry's weaknesses from making it highly susceptible to external threats.

The choice of the strategy should invariably be based on the evaluation of the above alternatives. These alternatives are crucial in achieving the objectives.
7. 2. 3. 4 Implementation of Strategy

A good strategy is not sufficient condition for success; it’s effective implementation is equally important. Many good strategies fail to achieve the results because of poor implantation. It is necessary to formulate a detailed plan to achieve the objectives by means of the chosen strategy. The term Implementation is used in a broad sense so that it encompasses the formulation of the plan to implement the strategy. The task of implantation involves mobilization and deployment of resources, including human resources needed to implement, organize and assign tasks to the various elements related to the task. For effective implementation of the strategy it is essential to formulate an implementation strategy.

7. 2. 3. 5 Evaluation of Strategy

Implementation of the strategy may not automatically result in goal achievement. Evaluation of strategy is that phase of the strategy formulation process in which the top administrators determine whether their strategic choice as implemented is meeting the desired objectives. The series of actions taken to implement the strategy is to be monitored and evaluated in order to ensure that the process would be implemented as per the plan. The information may be provided in advance (feed forward in order to arrest the possible deviations. Similarly the information failures in order to arrest the possible deviations. Similarly, information of failure may be provided in order to ensure future success. Thus, the strategy implementation process should be monitored, evaluated and controlled for successful implementation of strategies and achievement of goals. Failure to achieve the results may arise from any one or more of the following;
• Improper implementation of the strategy.
• Environmental changes which are not anticipated while formulating the strategy.
• Wrong diagnosis of the environment.
• Inappropriate strategy.

In figure 7.2 the loop connecting the evaluation to the beginning phase of the strategy formulation process indicates that strategy formulation is a continuous process, the evaluation providing the feedback for modification.

SECTION III

7.3 New Growth Strategy for Indian spices Exports

Based on the conceptual framework discussed above an export growth strategy for Indian spices sector is attempted here. The nature of internal and external environment in which Indian spices exports sector is operating can be understood from the description of the Indian spices economy (Chapter III). The trends in growth and instability of various spices exports as analyzed in Chapter IV and the determinants of growth and instability of spices exports as described in chapters VI and V respectively provides the necessary inputs for the formulation of the strategy. With this background the various components of the strategy can be explained as follows.

7.3.1 Objective of the Export Growth Strategy

India is the largest producer and consumer and exporter of spices in the world. It accounts for 44 per cent of global output and 47 per cent of exports by volume. Of the 4
million tones of estimated production in the year 2007-2008 the country exported only 8% of the produce. Even with these meager exports, India earned foreign exchange worth $1 billion, achieving a growth rate of 24% compared to the FY 2006-2007. Thus there is a vast scope for increasing exports in the future. That is why, India is aiming to become a global processing hub of spices and targeting at a foreign exchange earning of $10 billion by the year 2017. Thus the long term objective of the Indian spices export growth strategy is to achieve $10 billion revenue by 2017.

To achieve this long-run objective, we have to pursue two short-run objectives. One is to achieve an annual compound growth rate of 20 per cent in total spices exports by value in the next 10 years and the second is to stabilize the export earnings of spices. Thus achieving the long run objective of earning $10 billion export revenue through spices by the year 2017 depends on achieving the short run objectives of 20 per cent annual compound growth rate and tackling the issue of export instability. Therefore, the objectives or goals considered here for suggesting an export strategy for Indian spices sector are:

1. **Long-run objective:** achieving $10 billion export revenue by the year 2017.

2. **Short-run objectives:**
   - Achieving annual compound growth rate of 20 per cent in export earnings in the coming 10 years.
   - Achieving stability in export earnings.

With these objectives to be achieved, the next step in strategy formulation process would be the SWOT analysis, which forms the basis identification of alternative strategies from which a choice can be made.
7.3.2 SWOT Analysis of Indian Spices Exports:

In Chapter III, the internal and external environment in which the Indian spices sector is exporting spices to the world was discussed in detail. Based on this, the strengths, weaknesses, opportunities and threats (SWOT) of this sector are explained below. The present status of the Indian spices exports can be understood with this analysis, which forms the background for formulating an appropriate growth strategy for spices.

7.3.2.1 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
7.3.2.2 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.

7.3.2.3 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, neutraceautical, 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

7.3.2.4 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.

7.3.3 Strategic Alternatives of Export Growth Strategy

Based on the SWOT profile and the resultant SWOT matrix for Indian spices exports we can identify three alternative strategies for achieving the targeted growth for Indian spices exports which are as follows:

1. **High risk growth strategy**: The SWOT analysis of Indian spices exports shows that the ‘strengths’ and ‘opportunities’ far outweigh ‘weaknesses’ and ‘threats’. Strengths and opportunities are fundamental and weaknesses and threats are transitory. Thus, it appears that Indian spices sector has bright prospects for achieving targeted levels of growth in exports in the coming years by adopting a growth strategy primarily focusing on its internal strengths and utilizing the emerging external opportunities. That is continuing with the existing trade portfolio going for capacity expansion in tune with the growing international demand for spices. However, this is a high risk growth strategy in the sense that it doesn’t take into account the problem of instability and also the emerging threats. In theoretical sense it is a strategy aimed at achieving high growth with high levels of risk.

2. **Moderate risk strategy**: This is a strategy aimed at overcoming weaknesses to pursue
opportunities. This can be done by utilizing the opportunities by capacity expansions which are in tune with an optimal portfolio of exports which aims at maximizing growth subject to moderate levels of risk (instability). Thus, it is this strategy which can ensure maximum growth, with acceptable levels of risk (instability) for Indian spices sector.

3. **Low risk strategy**: This is a strategy which in the context external threats establishes a defense plan to prevent the decay and maintaining status quo. It is a strategy involving very low degree of risk. Here, the export portfolio is build in such a way that high risk markets and products are discarded completely and few products and markets having low levels of risk are concentrated. This is in fact a Niche strategy and may not ensure high growth.

7.3.4 Choice of Strategy:

The choice of a particular strategy from the above three alternatives should be based on their evaluation in the context of they being the means to achieve the twin objectives of achieving growth and stability. High risk strategy may achieve growth at the cost of stability while Low risk strategy sacrifices growth for stability. It is the Moderate risk strategy that is capable in principle to achieve the objectives of high growth with reasonable stability. Thus, given that our aim is to achieve an annual compound growth rate of 20 per cent in export revenue and at the same time stabilize export revenues, it is logical to choose the moderate risk strategy for Indian spices export sector. It should be noted that here growth is viewed as return and instability as risk, so that the well known Markowitz-Tobin Portfolio Theory can be utilized for suggesting a optimal trade portfolio for Indian spices.
7.3.4.1 Moderate Risk Strategy for Indian Spices Exports:

As already mentioned above, the moderate risk strategy for Indian spices exports is the one that is aimed at overcoming weaknesses and utilizing opportunities, which ensures realization of the twin objectives of growth with stability. However, as we have already seen in the earlier chapters, Indian spice trade portfolio is displaying high levels of instability, which is going to be a major constraint to achieve higher levels of growth. Therefore we should look for an optimal trade portfolio which basically aimed at minimizing the instability for a specified growth. Once such a portfolio can be determined, it can be compared with the existing portfolio and subsequently the required action plan to bridge the gap between them can be formulated. Thus the formulation of moderate risk strategy for Indian spices exports consists of two major parts:

1. Building an Optimized Trade Portfolio of Indian spices.
2. An action plan to realize the Optimised Trade Portfolio.

7.3.4.1.1 Optimised Trade Portfolio of Indian Spices

Before an attempt is made to build an optimal trade portfolio for Indian spices the basics of portfolio theory are explained first.

(i) Portfolio Theory:

Any investor would like to have the highest return possible from an investment. However, this has to be counterbalanced by the amount of risk the investor is able or desires to take. That is there is a positive relationship between the risk and return of a
A portfolio is a bundle or combination of individual assets or securities. The two main characteristics of a portfolio are the expected return and the risk measured by the variance (or the standard deviation). The behaviour of a portfolio can be quite different from the behaviour of individual components of the portfolio. This observation is the basis for portfolio theory, which says that although the expected return of the investment portfolio is simply a weighted average of expected returns of the individual investments that goes to make up the portfolio, the risk of the portfolio is less than the weighted average risk of the individual constituent investment. That is the risk can be reduced by diversification. Thus portfolio diversification can reduce portfolio risk without a consequent reduction in expected return. This is called the risk reduction effect of portfolio diversification. How portfolio diversification can reduce portfolio risk can be demonstrated with the help of a two asset portfolio.

(ii) Portfolio Return and Portfolio Risk: Two Asset Case:

We know that the return of a portfolio is equal to the weighted average of the returns of individual assets in the portfolio with weights being equal to proportion of investment value in each asset and the risk of the portfolio is equal to the variance of the portfolio return. Suppose an individual's investment portfolio consists of two assets, viz., A and B with expected returns of \( E(r_A) \) and \( E(r_B) \) and variances of returns as \( \sigma^2_A \) and \( \sigma^2_B \) respectively. Further suppose that the proportion of investment on A is 'x' and the
proportion of investment on B is \((1-x)\), then the expected return \(E(rp)\) and the variance of the return (risk) \(\sigma^2_p\) of the resultant investment portfolio can be written as:

\[
E(rp) = xE(r_A) + (1-x)E(r_B) \quad \text{--------(1)}
\]

\[
\sigma^2_p = x^2 \sigma^2_A + (1-x)^2 \sigma^2_B + 2x(1-x) \text{Cov}(r_A, r_B)
\]

\[
= x^2 \sigma^2_A + (1-x)^2 \sigma^2_B + 2x(1-x) \sigma_A \sigma_B \text{Cor}_{AB} \quad \text{--------(2)}
\]

It may be noticed from equation (2) that the variance of portfolio includes the proportionate variance of the individual assets and the covariance of the assets.

The covariance depends on the correlation between the assets in the portfolio. Correlation coefficient can take any value between +1 and -1. A correlation coefficient of +1 indicates perfect positive correlation such that the returns of the two assets will vary in perfect lock-step, whereas a correlation coefficient of -1 indicates perfect negative correlation. In this case the returns on the two assets will move in perfect negative lock-step. A correlation coefficient of value 0 implies that there is no relationship between the returns of the two assets. Under normal circumstances the correlation coefficient is neither perfectly positive nor perfectly negative. If we incorporate this observation into equation (2), we have the following result:

\[
[x^2 \sigma^2_A + (1-x)^2 \sigma^2_B + 2x(1-x) \sigma_A \sigma_B \text{Cor}_{AB}] < [x^2 \sigma^2_A + (1-x)^2 \sigma^2_B] \quad \text{---(3)}
\]

The above equation says that in general the risk of the portfolio would be less than the weighted average risk of the assets that go to make up of the portfolio. Thus, it is clear that
portfolio diversification can reduce portfolio risk without a consequent reduction in expected return. For a well-diversified portfolio, the risk - or average deviation from the mean - of each asset contributes little to portfolio risk. Instead, it is the difference or covariance of individual asset's levels of risk that determines overall portfolio risk. As a result, investors benefit from holding diversified portfolios instead of individual stocks.

(iii) Efficient Frontier and Optimal Portfolio:

The question of how to identify the best level of diversification can be answered with the help of the concept of Efficient Frontier, which can be explained as follows: for every level of return, there is one portfolio that offers the lowest possible risk, and for every level of risk, there is a portfolio that offers the highest return. These combinations can be plotted on a graph, and the resulting line is the Efficient Frontier. Figure 7.3 shows the Efficient Frontier for just two assets. Any portfolio that lies on the upper part of the curve is efficient: it gives the maximum expected return for a given level of risk. A rational investor will only ever hold a portfolio that lies somewhere on the efficient frontier. The maximum level of risk that the investor will take on determines the position of the portfolio on the line. That particular combination that causes the risk level of the portfolio to "bottom out" (i.e. lowest level of risk) is known as the minimum variance portfolio. It is not possible to lower the risk of the portfolio any further. This is called the Optimum Portfolio. In Fig.2 such a portfolio is determined at point E on the Efficient Frontier and the corresponding variance is the minimum variance (\( \sigma_{MV} \)). The minimum variance portfolio can be written as follows:\(^3\):
where, $x$ is the proportion of investment on asset A and $(1-x)$ is the proportion of investment on asset B.
7.3.4.1.2 The Portfolio Optimization Problem in the Context of Export Diversification of Indian Spices:

The basic principles of Portfolio Optimization theory were explained above. Now, we shall apply this theoretical framework to the analysis of export diversification problem in terms of trade off between risk and return of export activity of Indian spices. Here, return and risk of export activity refers to growth and instability in export earnings. Export diversification can minimize instability for a given level of growth. The group of 15 major Indian spices that are being exported are considered its spice trade portfolio (Table 7.1) Thus, export diversification of spices in the context of portfolio variance refers to reducing the instability of export earnings of spices, brought upon by varying the relative export shares of different spice commodities in the spice trade portfolio. The spice trade portfolio variance can therefore be written as:

\[ V = \sum_{i=1}^{15} W_i^2 \text{Var}(X_i) + \sum_{i=1}^{15} \sum_{j \neq i} W_i W_j \text{Cov}(X_i, X_j) \quad (6) \]

Where, \(W_i\) is the export share of spice ‘i’, \(\text{Var}(X_i)\) is the variance of export earnings for spice ‘i’, \(\text{Cov}(X_i, X_j)\) represents the covariance in export earnings from commodities \(i\) and \(j\) and the sum of \(W_i\) equal to 1 and all \(W_i\) are non-negative. The first term in equation (4) is the non-diversifiable risk and the second term is diversifiable risk. Co variances are fundamental for export diversification strategies that are aimed at hedging against lowering export earnings instability. If export earnings from commodity ‘i’ and ‘j’ are negatively correlated, this covariance lowers the overall variance of export portfolio.
The portfolio variance approach to export diversification is implicitly based on the objective function of a risk averse policy maker whose sole objective is to minimize the instability of export earnings subject to a given rate of growth in export earnings. This exactly serves our purpose for formulating a growth strategy for Indian spices exports. The objective function of a risk averse policy maker aimed at export diversification of Indian spices can be written as follows:

\[ E(X^A) = E \sum_{i=1}^{15} W_i X_i \]  \hspace{1cm} (7)

\( E(X^A) \) is the mean expected export earnings given by the export portfolio ‘A’ of Indian spices. From equations (6) and (7) we can derive an efficient set of possible export configuration that minimize risk for a specified expected return (20% in our case) can be obtained by solving the following optimization problem:

\[
\text{Minimise: } V = \sum_{i=1}^{15} W_i^2 \text{Var}(X_i) + \sum_{i=1}^{15} \sum_{j \neq i} W_i W_j \text{Cov}(X_i, X_j) \hspace{1cm} (8)
\]

\[
\text{Sub. To: } E(X^A) = 20\% = E \sum_{i=1}^{15} W_i X_i \hspace{1cm} (9)
\]

and \( W_i > 0 \) for \( i = 1, 2, \ldots, 15 \).

This is the standard Markowitz quadratic programming problem of portfolio theory and is often called Mean Variance (MV) optimization ⁴. The term mean refers to the mean or the expected return of the portfolio and the variance is the measure of the instability (risk) associated with the portfolio. The solution to this problem will provide an diversified
portfolio of Indian spices that ensures 20% annual growth and minimum instability. This can be obtained by generalizing the results of equations (4) and (5) as shown above.

7.3.5 Data and Calculations

The data on present spice trade portfolio is obtained from the relevant chapters of the present work and shown in Table 7.1. The trend growth rates and instability indices of the various spices for the period 1960-2007 are taken as the returns and variances of the spice portfolio. The weights of the portfolio are the respective shares of each spice in total exports earnings of spices during the year 2007-08. The optimization problem is solved with the help of computer software package MATLAB. The procedure adopted is as follows:

For a given "risk tolerance" $q \in [0, \infty)$, the efficient front is found by minimizing the following expression:

$$
\frac{1}{2} \left[ \bar{W}^T \Sigma W - q \cdot R^T W \right]
$$

where,

- $\bar{W}$ is a vector of portfolio weights. Each $w_i \geq 0$ and $\sum w_i = 1$.
- $\Sigma$ is the covariance matrix for the spice items in the portfolio.
- $q$ is the risk tolerance factor, such that $0$ results for minimal risk and $\infty$ results for maximal return.
- $R$ is a vector of expected returns.

Then the Efficient Front is calculated by repeating the optimization for various $q \geq 0$. 
7.3.6 Results and Discussion

The Mean Variance Optimized Portfolio of spice trade, which is a portfolio that yields a return (growth rate) of 20 per cent and having the minimum risk (instability), is reported in Table 7.2. The portfolio clearly shows export diversification of Indian spices in favour of value added products. That is for achieving growth and stabilizing in export earnings the shares of various spice commodities in the existing export mix should adjusted in favour of value-added products. That is the share of value-added products (Spice oil, curry powders and Mint products) must increase to nearly 65 per cent from the present level of about 44 per cent. The shares of Chilli and pepper the major grounded spice exports needs trimming in the existing export mix. However items like turmeric and cumin because of their growth potential and low levels of instability seems to have retained their shares in the optimum portfolio of spices. The results thus clearly indicate that the export strategy for Indian spices should be towards export diversification.

7.4 Export Diversification for Indian Spices

Export diversification can help to achieve stability oriented and growth oriented policy goals. It can lower instability in export earnings by providing a broader base of exports and enhance growth by substituting commodities with positive volume trends for those with declining volume trends, through increasing value-added of export commodities by additional processing and marketing.

Export diversification can take different forms and has different dimensions. Export diversification can be achieved by either by adjusting shares of commodities in the existing export mix, or by adding new commodities to the export mix. In case of Indian spices,
export diversification should be achieved by adjusting the existing export mix because any attempt to add new commodities to the existing trade portfolio may bring about instability in export earnings. Coming to the dimensions of export diversification of Indian spices, there are both horizontal and vertical dimensions. Horizontal diversification involves adjustment in the export mix in order to counter export quantity instability. Vertical diversification involves creation of additional uses for existing and new commodities through value-added activities such as processing and marketing. Vertical diversification can expand market opportunities for raw materials which enhance growth and lead to more stability since processed goods tend to have more stable prices than raw commodities. These different dimensions of diversification are related to the market orientation and degree of processing of different export commodities.

For Indian spices, export diversification involves both horizontal and vertical integration among existing commodities and value-added products in the optimum export mix. It should be noted that, while both horizontal and vertical diversification may be equally important for expansion in spice trade, requirements for the two could vary considerably in terms of technological, managerial and marketing skills. For instance, a diversification policy contrived to enhance vertical diversification may require more advanced technology, skills and initial capital investment than horizontal diversification policies do. On the contrary, vertical diversification could also be linked with higher learning possibilities that, in turn, may produce greater dynamic externalities than that of horizontal diversification. With this conceptual framework as a background the various policy measures and action plans for implementing the export growth strategy of Indian spices can be as follows:
7.5 Suggested Growth Strategy for Indian Spices Exports

The optimized trade portfolio for Indian spices aimed at achieving an annual growth rate of 20 per cent and minimizing export instability indicates the need for diversification of existing trade portfolio. That means India should transform towards, "From a supplier of raw spices to global supplier of value-added spices". This transformation process can be achieved by a series of strategic policy interventions. Policy interventions need to be targeted at specific areas and spices, to remove impediments adversely affecting the country's spices export:

1) Two major hurdles to achieve sustained growth in exports of spices is inadequate surpluses for exports and insufficient quantities of quality spices. The current situation is such that there is no exportable surplus in the case of many items because of the huge domestic market where the growers are getting remunerative prices. This huge domestic demand leaves behind little surplus for export and so exports are happening by accident rather than design. Thus, increasing production of spices to generate more exportable surplus is the first step in the growth strategy. Production of spices can be increased by improving productivity. Our productivity is the lowest in the world in many spices. There is a wide gap between average yields of Indian spices and that of international competitors on the one hand and to that is achieved in the research stations. Major efforts are needed to bridge this gap in productivity. Some of them are:

i) The major input, which can offer a higher productivity, is high yielding varieties. 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. These varieties have not
been fully exploited. The missing link here is adequate initiatives to produce and supply improved varieties. Thus, steady supply of seeds of high yielding verities is a strategic need in improving productivity of spices.

ii) Replantation and Rejuvenation of sterile garden programmes for spice crops like pepper, cardamom, ginger etc., can dramatically improve the productivity levels of these crops. Centrally sponsored schemes for the production and distribution of adequate quantities of elite planting material can make this program a success.

iii) Non-availability of suitable fertilizers and plant protection chemicals, suitable irrigation, facilities for on-farm processing and storage, and adequate credit are some of the other constraints on improving productivity. Efforts to improve the availability of these crucial inputs especially by the state governments are strongly recommended.

iv) Inadequate price for producers. This is a recurring complaint of the Indian spice farmer. The price situation is directly linked to the supply position of each year. The price which prevailed the previous year often influences farmers to go in for large scale cultivation, irrespective of stocks available and neglecting the possibility of alternate crops. This results in severe price crash. This situation repeats itself and the vicious circle continues. Thus, there is a need for price support schemes for major spices.

vi) Insufficient mechanisation of spice production and processing is also causing low productivity. Appropriate technologies need to be developed to improve productivity of workers engaged in spice production and processing. It will not only help in ensuring hygienic post harvest handling but also in cost effective production. Ginger peeling, solar
drying of spices, boiling, drying and polishing of turmeric, on-farm processing of seed spices, are some of the areas which need immediate attention.

vi) Natural calamities continue to effect productivity of spices, pushing the small and marginal grower into a crisis situation. In order to prevent this and to build up his confidence in sticking to cultivation of spices, it is necessary to extend crop insurance, with suitable packages to contain all possible risks in the areas of production, processing, storage and transport. Therefore Crop Insurance is urgently needed in the spice sector to hedge against unstable levels of productivity.

2) Coming to crop specific export growth strategies, Chilli, Garlic, Coriander, Cumin, Fennel, Fenugreek and Turmeric are the items having potential for high growth but are highly unstable in terms of export earnings (Chapt-IV). The government's policy in such a situation should clamp down capacity creation and exploring alternative markets. Thus export of these products should takes place only from Domestic Tariff Area (DTA), were the home market provides the alternative outlet or if the firm is in an Export Processing Zone (EPZ) or is a 100 per cent Export Oriented Unit (EOU), a minimum per centage of its production, should be stipulated for exports to preferential trade agreement countries. These steps can minimize to certain extent the costs of instability. However, some of these steps may slow down the rate of capacity creation and hence may lead to under fulfillment of the potential demand in the short run, but it is preferable to happen rather than unexpected capacity attrition in the future. Apart from this discussions must be taken up with the Governments of principal importing countries to reduce the volatility or at least, instituting some bilateral methods by which prior warning can be given.
3) Traditional export items like pepper, ginger and cardamom are facing severe competition from newly emerging producers under the WTO regime. These new entrants have practically no domestic market, which compels them to sell their produce at cost price or even below it. Thus, long run survival of pepper, ginger and cardamom exports depends on the price-competitiveness for which various cross subsidization programmes may be necessary. Efforts must be made on government to government basis to enter into long term contracts to ensure stable growth and reduce costs of high instability. Given that there is a gradual decline in their export performance, exports of these products in whole form should be discouraged and value added forms of these should be encouraged.

4) Another strategy that can boost production of spices in India is the “Extension of Spice Cultivation in Non-Traditional Areas”. Non-traditional areas for spices like the North Eastern region and hilly areas of other states, especially the newly formed ones, offer good potential for spice production for export. The climatic and other factors in these areas are congenial to spice cultivation. NGOs and SHGs can be engaged in the introduction and maintenance of spice crops in these areas. The activities identified are:

- A comprehensive base line survey on the adaptability of various spices to non-traditional areas.
- Exploratory studies on the availability of indigenous varieties of spices in these areas.
- Support to the growers on input supply especially planting materials, transfer of technology (both pre and post-harvest), storage and marketing.
• Establishment of export linkages.

• Empowerment of rural communities, especially of women, in areas of production, on-farm quality management and marketing.

5) A major hurdle for sustained growth in spices exports is the quality aspect. Quality is the key to spices exports. At present there are no international food safety standards specific to spices. As a result, regulatory limits which are applied to cereals and nuts are enforced for spices as well. In this context we have to meet the extremely stringent quality parameters set by the importing countries. Thus, India’s traditional competitiveness in spices exports is under severe threat due to new quality standards set by importers especially in the post WTO scenario. To face this challenge the following strategies are recommended.

• Changes have to be made in production, post-harvest and processing practices and technologies with main focus on quality. The motto should be ‘Clean Spices’ rather than ‘Cleaned Spices’.

• Changes have to be also taken place in quality assurance and supply chain management systems to suit the needs of international quality standards.

• Educating growers, traders, manufacturers and exporters on changing quality standards and quality upkeep.

• Empowering the processor and manufacturer to achieve Good Manufacturing Practices (GMP) through Spice House Certificates and Indian Spices Logo of the Spices Board.
• Acquisition of ISO 9000/14000 and HACCP certification by processors/manufacturers.

• Development of infrastructure for quality evaluation in areas of physical, chemical and microbiological testing/analysis.

• Organic cultivation of spices should be encouraged, because of their better quality and higher price realization.

• Coordinated efforts with other spices exporting countries should be made to formulate International quality standards exclusively for Spices because it is not realistic to apply food quality standards to spices, as the daily average intake of spices is much less than the food.

6) The most important part of growth strategy of Indian spices exports is diversification of spice trade portfolio in favour of value-added products. The Indian spice export basket consists of around 50 spices in whole form and more than 80 products in value added form. Value added products of spices mainly consist of spice oils and oleoresins, mint products, curry powders and mixes, specialty extracts and blends. Currently value addition is about 8 per cent and it has to be tripled in the coming 10 years if the share of value added spice products in total spices exports to reach to about 65 per cent from the present level of 40 per cent. The potential for exporting value-added spices exists because of the following reasons:

- The trend towards internationalisation and increasing consumption of ethnic foods has created growing interest in value added products. A broad selection of spices can be found in today’s kitchen.
The usage of value added forms of spices and herbs by consumers is increasing because these products are appreciated as completely natural ingredients, rather than artificial additives.

Preferences for natural colouring and flavouring due to increasing health consciousness.

Chains of fast food restaurants. Ready-to-use segments, like pizzas, sauces and other convenient food

Micro wave cooking.

Technological Revolution in packaging

Education on consumer to indicate benefits of processed food products.

Ability to offset seasonal supply and demand effects in fresh products.

Health food sector, for example, organic spices & herbs and herbal teas.

New authentic varieties of mixed spices and herbs, like pimento, chillies, allspice

The potential for value added spice products can be utilized and Indian spice trade portfolio can be diversified by decommoditising spices exports and exporting more high value-added spices. The presence of high value items in the export market will change the entire complexion of exports, replacing value by volume and also brings in stability in export earnings. The following strategic initiatives are necessary in this context.

i) Mint Products: These value added products contributes to nearly 30 per cent of our spices export revenue. They also recorded highest trend growth rates in terms of export volume (22.14 %) and export value (30.21 %) and are also extremely stable. Therefore, these items should be actively encouraged to achieve a share of nearly 40 per cent in the
coming years which is crucial for achieving an overall growth rate of 20 per cent in total spices exports. In this context the following policy actions are recommended:

- Increasing production and removing impediments to capacity creation should be the immediate priority, otherwise opportunities are lost by the demand shift to the alternative supply sources. The value addition in mint should be increased from the present level of 20 to 25 per cent.

- Nearly 80 per cent of Mint is cultivated in one state, UP. Its production can be substantially increased by encouraging farmers in other states to take up cultivation of mint by making available new high yielding varieties and improved extension services.

- But for exporting more we need the required infrastructure for manufacturing these products, such as better processing and packaging equipment and making available quality raw materials at acceptable prices. Here, there is a need to make UP the processing hub of mint products.

- Care should be taken to establish credibility with importers about quality and dependability of supplies of this product from India. Therefore, strict quality control and deliver schedule must be imposed on the Indian suppliers of these products. Non-reputed and fly-by-night operators should be kept out to the extent possible. By and large mint products are the ideal products for production in the Export Processing Zones (EPZs) and Export Oriented Units (EPUs).

- New markets based on new uses, such as application of mint products in the medicinal, nutraceutical, cosmetic, pastry and food colour segments have to be developed.
• With competition emerging from various fronts focus should shift to retail sector, which needs promotional support, brand promotions, in-store publicity and advanced packaging, developing products as per the likes and dislikes, preferences and needs of the consumer becomes necessary.

ii) Spice Oils and Oleoresins:

India has a global monopoly in spice oils and oleoresins. Together they are contributing to about 13 per cent of total exports of spices by value. They are growing at an impressive annual compound growth rate of 18 per cent by volume and 27 per cent by value. The share of these items in total spices exports has to reach 18 per cent as per the optimised trade portfolio of spices. The following strategic initiatives are needed in this context.

• The traditional markets for spice oils and oleoresins are the USA and EU and are saturating. Thus, there is a need for geographical diversification of exports of these items. The accent should be on the selection of right products and efficient export promotion. For effective selling the products should be rightly priced and prices should be stable. Exporters must identify the needs of the market and supply the desired products rather than thrust an available product to the customer. Product differentiation is an effective marketing strategy for these items.

• With the reported use of spice oils and oleoresins in soft drinks, hamburgers, pizzas, hot dogs and in ethnic foods, the demand for spice oils and oleoresins is bound to increase. But for exporting more we need the required infrastructure for manufacturing these products, such as better processing and packaging equipment.
and making available quality raw materials at acceptable prices on sustainable basis. Encouragement should be given to private entrepreneurs to start processing industries for extraction of essential oils and oleoresins.

- The demand for easy-to-use spices, natural flavours and colours will be on the increase not only in developed markets but also in developing markets. The strategy will therefore need to identify these demands and target production accordingly. In this context, turmeric and capsicum oleoresins exports have shown considerable growth and the potential is very large. The key input is the cultivation of high curcumin varieties in various parts of the country. Thus, organic cultivation of these varieties should be encouraged with appropriate input delivery system.

- Creating greater awareness about the benefits of using by-products of spices viz. spices oils, oleoresins in sectors like health, food processing, perfumery and pharmaceuticals can generate a sustainable demand for these products in the coming years.

- There is also need for a fresh look at the sales tax structure, farm tax policies and import of certain raw materials with reference to the production of spice oils and oleoresins

### iii) Curry powders

This is another area where there is lot of potential to increase exports. At present the annual export of curry powders is about 4000 tones and its share in total export earnings of spices stood at about 2.5 per cent. The export value realisation of curry powders is growing
at an annual compound growth rate of 13.5 per cent per annum and is also quite stable. Indian curry powders are popular in Europe and the US, but full advantages could not be derived because the UK also makes curry powders and supplies them to various countries. Thus, curry powders exports should be actively encouraged by increasing production and removing the impediments in capacity creation. The following strategic initiatives may be suggested.

- Curry powders are the ideal products for production in the Export Processing Zones (EPZs) and Export Oriented Units (EOUs). Quality and dependability of supplies of this product is extremely important for achieving high export volume growth rates.

- Exporting more of these products depends on creating the required infrastructure for manufacturing these products in the country such as availability of quality raw materials at acceptable prices, better processing and packaging equipment, development of storage and warehousing, transport and market infrastructure, close coordination among various organizations related with exports, etc.,

- Export strategy of spice mixes should focus on retail sector, which needs promotional support, brand promotions, in-store publicity and advanced packaging, developing products as per the likes and dislikes, preferences and needs of the consumer becomes necessary. Though precise data are not available, 40 to 50 per cent of Indian spices imported into the US, Canada, West Germany, Japan, Hong Kong and Australia are converted into retail packs of curry powders and spice
mixes and re-exported, where the price realization is 10 to 15 times more than the whole spices. India can gain a lot if it can enter into export of retail packs of curry powders and spice mixes with international quality standards and globally competitive prices.

- Another way to enhance our curry exports is to promote the Indian cuisine in the traditional and non-traditional markets whereby the consumer would develop a liking for the Indian food and through which to the curry powders. We have to do something the way the Chinese and the Taiwanese did to promote their foods all over the world to popularise our cuisine abroad.

- Another strategic initiative would be to explore markets, where there are substantial numbers of people of Indian origin are residing. These markets would provide assured demand for Indian curry powders if tapped properly.

7.5 Implementation and Evaluation of the Growth Strategy

The following suggestions can be made for the effective implementation and evaluation of the above suggested growth strategy for Indian spices exports.

- Monitoring and coordinating body at the level of Planning Commission to coordinate spices programs under different missions.
- Establishment of a Task Force on Spices Exports coordinating the efforts of both the Central and State Governments to promote spices exports.
- Setting up of an Empowered Committee to formalize the modalities of public-private partnerships in the contract farming of spices.
• Establishing an Indian Institute of Spice Technology to spearhead research and to coordinate with other institutions in the field of productivity and quality control.

• Empowerment of rural communities, especially of women, in areas of production, on-farm quality management and marketing.

• Developing a common perspective on the constraints, opportunities and other facets of spices-exports by the various stakeholders like producers, research organizations, extension agencies, agro processing industries, policymakers and exporters is critical. For this an easily accessible information system including database on aspects such as volume of trade, quality specifications, demand supply scenario, border prices regulations governing certification and exports of commodities and countries along with inventory of available technologies for meeting the quality is advocated.

• The advancement of information technology should make it easier to know and disseminate real time information so as to avoid over production and the consequent steep fall in prices, which lead to farmers' distress. Proper usage of the remote sensing network established by the National Informatics Centre at district level will provide for rapid transfer of information.

• The implementation and adherence to quality assurance measures such as ISO 9000, ISO 14000, MPR, HACCP etc., is possible only through trained manpower. Therefore, long-term educational programmes and short-term trainings are required for developing manpower for sustainable spices exports.

• Necessary legislation in pesticide usage (registration, elimination of harmful pesticides) and judicious use of pesticides to improve the quality is recommended.
• The Spices Board will have to gear itself to working more closely with the State governments and with research laboratories of the Indian Council of Agricultural Research.

7.6 Summary and Conclusions

The present chapter attempts to formulate a growth strategy for Indian spices exports based on the conclusions and observations of the earlier chapters. The prominent features of the current growth strategy of spices exports were discussed in the Section I of the chapter. Section II contains the outline of the conceptual framework of the strategy formulation process, which forms the basis for suggesting the export growth strategy. 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.

Based on the SWOT 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 export basket to obtain an Optimal Trade portfolio for Indian spices. It clearly shows that the present trade portfolio of spices needs geographical and product 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 in Section III, 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 Growth Strategy if implemented and monitored properly is expected to achieve the stated objectives.
Table 7.1

SPICE TRADE PORTFOLIO OF INDIA (2007)

<table>
<thead>
<tr>
<th>Spice Commodity</th>
<th>Weight (% Share of Total Exports*)</th>
<th>Return (Growth Rate)</th>
<th>Risk (Instability)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepper</td>
<td>11.30</td>
<td>12.76</td>
<td>0.52</td>
</tr>
<tr>
<td>Cardamom(l)</td>
<td>1.80</td>
<td>16.30</td>
<td>0.42</td>
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<tr>
<td>Cardamom(s)</td>
<td>0.54</td>
<td>4.20</td>
<td>0.51</td>
</tr>
<tr>
<td>Chilli</td>
<td>24.72</td>
<td>16.18</td>
<td>0.89</td>
</tr>
<tr>
<td>Ginger</td>
<td>0.63</td>
<td>9.10</td>
<td>0.41</td>
</tr>
<tr>
<td>Turmeric</td>
<td>3.53</td>
<td>13.50</td>
<td>0.34</td>
</tr>
<tr>
<td>Fennel</td>
<td>0.11</td>
<td>13.30</td>
<td>0.42</td>
</tr>
<tr>
<td>Coriander</td>
<td>2.98</td>
<td>17.40</td>
<td>0.83</td>
</tr>
<tr>
<td>Cumin</td>
<td>6.57</td>
<td>16.70</td>
<td>0.71</td>
</tr>
<tr>
<td>Celery</td>
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<td>9.06</td>
<td>0.26</td>
</tr>
<tr>
<td>Garlic</td>
<td>0.50</td>
<td>13.33</td>
<td>0.47</td>
</tr>
<tr>
<td>Spice oils</td>
<td>12.63</td>
<td>27.20</td>
<td>0.62</td>
</tr>
<tr>
<td>Curry powders</td>
<td>2.51</td>
<td>13.50</td>
<td>0.26</td>
</tr>
<tr>
<td>Mint products</td>
<td>28.81</td>
<td>30.21</td>
<td>0.28</td>
</tr>
<tr>
<td>Others</td>
<td>3.88</td>
<td>13.09</td>
<td>0.27</td>
</tr>
</tbody>
</table>

*By value in the year 2007

Source: Author’s calculations.
### Table 7.2

**OPTIMISED TRADE PORTFOLIOS OF SPICES**

<table>
<thead>
<tr>
<th>Spice Commodity</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Cardamom (l)</td>
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<td>Coriander</td>
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<td>Cumin</td>
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<td>Celery</td>
<td>0.29</td>
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<td>Garlic</td>
<td>1.23</td>
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<td>Spice oils</td>
<td>17.12</td>
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<tr>
<td>Curry powders</td>
<td>10.19</td>
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<tr>
<td>Mint products</td>
<td>37.13</td>
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<tr>
<td>Others</td>
<td>2.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
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Source: Author’s calculations.
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   Wiley, New York, 1995

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