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EXPLORING MARKETING OPPORTUNITIES FOR INDIAN PEPPER IN INTERNATIONAL MARKET DEALING WITH STRUCTURAL BREAKS

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ABSTRACT

The present study analyzes the performance of Indian pepper and growth in its production, export and productivity to study marketing opportunities for pepper at the multintional level. When we analyze the time series data, errors with the potential to display heteroskedasticity and temporal dependence are identified, resulting in possible unit roots and co-integrated models along with the models with trending variables among others. An attempt is made to study the structural breaks in the Real GDP, export of pepper, REER, Production, Productivity, Area and Inflation. The years with strong structural breaks have been identified. The reasons for these breaks are globalization, exchange rate volatility and climatic fluctuations and so on. Some of the variables, which have a strong influence on export performance, have not been taken for analysis because of the strong presence of multicollinearity.

KEYWORDS: *Export, Production, Productivity; Area under Cultivation, Structural Breaks, REER, Real GDP, Inflation, Globalization, Exchange Rate, Climatic Fluctuations*

INTRODUCTION

In the year 2008–09, the major plantation commodities' share in India's total exports was 1.7%. In India, the majority of plantation crops are predominantly grown in Kerala, Tamil Nadu, some parts of Karnataka, North-Eastern states and majorly in West Bengal. The socio-economic development of these regions has significantly increased due to the plantation sector. It has also provided employment to millions of individuals. Like most sectors of the Indian economy, growing global economic integration in recent years has exposed India's plantation sector to increase the global competitiveness [B. H. Nagore]. In a capitalist economy, the competitiveness of the products is important not just for the export of the products but also for survival in the local market, as there is uncertainty of the cheaper products entering from the global market to the local market. In this scenario, it is imperative to know where does the plantation products of India stand in the global market. To address this question, it is significant to study the competitiveness of plantation products in the global market, when compared with those of other dominant suppliers. In addition to the competitiveness of the rate of the plantation product in the international market, supply-side factors like trends in production, productivity and local requirements among large consumers and suppliers at the local and international levels must be analyzed [Nagoor, B. H. and Nalin Kumar]. The growing economic integration among countries via regional and multilateral trade agreements is also

changing the way of conducting trade for various commodities. For example, the former USSR was once a major trading partner of India, but changes in the economic relations of India and the Russian Federation under the liberal trade regime have resulted in the loss of the Russian Federation market for most of India's traditional products, majorly incorporating plantation products [Nagoor B. H]. This changing scenario raises concerns about the ability of India's plantation products to look for novel markets. There is common angst about the Free Trade Agreements (FTAs) between the Association of Southeast Asian Nations (ASEAN). Thus, provided that ASEAN is a source of plantation products priced comparatively low, India's plantation sector will be affected adversely. Concerns from producers' end have been raging about the entry of low-price products from such trade partnerships. The question arises on the advantages of the import of cheap products, along with the value-added by India to these products for their re-export. The question also arises in the role of European countries. Also, questions like the availability of a market for value-added plantation products enquires for a dynamic rather than simple static analysis of the impact of FTAs. [Joseph K. J.].

Most related studies suggest that plantation crops be given greater emphasis because these crops are a major item in the export basket as well as a source of income to most of the people in the country. A major thrust of these studies is spices, which is the only farm commodity that has had a significant share in the progress of Indian civilization. History of spices from India can be traced back to human civilization and references to spices and their trade can be found in the texts by 'Manu', the lawgiver, in 4000 BC, Vedas (6000 BC) and the Babylonians and Assyrians (around 3000 BC), the Old Testament (1000 BC) of the Bible, among other ancient manuscripts. Historically, India, also known as the land of spices from the West Coast of India, specifically the Malabar Coast, was known to have dominant trade relations with Greece, ancient Egypt and Rome. The 'King' and 'Queen' of spices, that is, Black pepper and cardamom respectively were cultivated in the tropical zone of South Kerala. If Kerala is taken into consideration, this state is highly suitable for the cultivation of black pepper, cardamom, ginger, turmeric, clove, garcinia and nutmeg. In the past, many habitants like Arabs, Assyrians, Babylonians, Phoenicians, Israelites, Greeks, Romans and Chinese felicitated spice trade from the coast of Kerala. The ancient Egyptians were the prime customers of spices, as they used it for many purposes like making perfumes and holy oils that were in turn used to preserve dead bodies of kings and people of high stature. It has been recorded that Hatshepsut, the then Egyptian queen sent five ships across the Red Sea to obtain spices from the east. Also, Alexandria in Egypt was the center for trade in oriental spices.

The demand for spices and its products continues to increase in both local and international markets. India's repertoire as a spice country has managed to keep a constant influx in foreign exchange. Despite such epithet, the sector has not achieved the required level of development due to problems in marketing, the supply chain, exports and pre- and post-harvest activities. Jerome and Ramanathan studied the growth of the world pepper market for the period from 1975 to 1990. Among exporting countries, Sri Lanka recorded the highest annual compound growth rate of 24.59%, primarily due to its low base in the initial years. India recorded a positive growth rate buta contrast the growth rate was observed. The total exports in comparison to other producing countries were statistically non-significant. Statistical growth for imports have shown a negative 2.56% for Argentina and a positive upward hike of 11.64% was witnessed for Saudi Arabia.

A trade information brief report showed that the total global production of spices has increased several folds since the 1960s, from 1.7 million metric tons in 1965 to 6.6 million metric tons in 2005. This growth is due to advances in production techniques and increases in yields and cultivated land to meet the growing consumption level of spices on a global scale. K. Krishnamoorthy and V. A. Parthasarathy have pointed out that the productivity of pepper is slowly decreasing, mainly because of the prevalence of, pests, drought and epidemic disease. Clean spice is a concept that is

catching on and this is achieved through the integrated approach for pest, disease and nutrient management involving resistant varieties, biocontrol, botanicals and organic farming. A very detailed account of the problems that may affect pepper production has been given in the paper. The economics behind this production loss could be analyzed as an extension.

C. J. Punnathara in his article had given a quantitative account of the present situation of pepper and cardamom in the global market. During the corresponding period of the last few decades, the country had exported 2,08,775 tonnes of spices valued at Rs 2,135 crores. The foreign exchange earnings were at $464.92 million. The redeeming feature is that in spite of the sharp fall in quantity, both the rupee and dollar realization have been looking up. During April–July 2011, the export of pepper, small cardamom, large cardamom, ginger, turmeric and other spices, such as tamarind and asafoetida have shown an increase both in volume and value. A total quantity of 7,550 tonnes of pepper valued at Rs. 200 crores have been exported as against 6,800 tonnes valued at Rs. 115 crores in April–July 2010. The unit value realization of large cardamom has also improved during the period. Compared to the spices export target of 5,00,000 tonnes valued at Rs 6,500 crores ($1,450 million) fixed for the financial year 2011–12, the country has achieved 32% of the quantity at 1,57,725 tonnes, 40% of the rupee earnings at Rs. 2,613 crores and 40% of the foreign exchange target at $585.46 million in April–July 2011–12.

This article focused on the improvement of export even though the quantity has declined. The value and earnings have shown an upward trend. The focus should be on this particular fact. The reasons for the loss of production and productivity should be analyzed separately.

This report of the working group on the question of improving production and productivity revealed several research gaps requiring focused attention. Improved fruits, vegetables, plantation crop, medicinal and aromatic crop, flowers, ornamental crop, spice, cashew, and oil palm varieties/hybrids with potential for high production and biotic and abiotic stress resistance are urgently needed. Horticulture-based cropping systems is considered to be a good resolute for agriculture that is highly dependent on their climatic areas. Gaps also exist in the availability of desired varieties of fruit, vegetable and flower crops for specialized uses in processing and export. Consistent methods for rapid progression in agricultural techniques, a comprehensive system to integrate nutrients in plants and better pest and disease management are required to boost commercial crops.

The Trade Information Brief report elucidates current problems that the spice market is facing in the new world economic order, including changes in the demand for spices, supply, prices, marketing, value chain and so on. The report cites the failure of international cooperation to stabilize product prices and to match supply to demand, which is resulting in overproduction and stockpiles. The variation in prices of commodities is often a catastrophe for small farmers and is compounded by the effects of laws governing trade, deregulation and the loss of input subsidies and extensions in public funding service. Developing countries suffer the most at the hands of these changes. In developed countries, there has been steady growth in demand for a year-round supply of horticultural and other products over the past decade, including alternative health products in the EU and North America. In developed countries, the demand for high-value products is governed by purchasing power and urbanization, stimulating large retail, wholesale chains and outlets. Diversity is eroded as a few large scale suppliers are influencing distribution channels of products and services, including the retail market. Due to increasing safety legislation in Europe and North America, retail chains exert higher levels of control and the expansion of vertical integration has resulted in the entry of multinationals at lower levels of the supply chain, especially in

large-scale agriculture. The shift from archaic means of production to the high-value generation of spice is most likely to persist, so active participation from developing countries is expected.

Keeping all the above-said facts about the production, productivity and export of spices, it is realized that a detailed analysis of two spices viz., pepper and cardamom, the King and the Queen need more attention. Very few studies have come up with an analysis of almost all the factors like production, productivity, area and export in the pre- and post-globalization era. This study is significant in this line. It takes into account almost all the areas in which an economist should focus on.

Hypothesis

The performance of Indian pepper and cardamom is analyzed by using a simple growth index. The formula for calculating the growth index is given as Yt-Yt-1/Y t-1. The following table shows the growth of Indian pepper in terms of export, production, area and productivity in the last 42 years.

Data Source and Methodology

The Following Methodologies are used to understand the Study

- Description of crops taken for analysis
- Type of data and its source
- The analytical tools and techniques used

Description of Crops taken for Analysis

The principal spices, namely, pepper and cardamom have been taken for analysis because India ranks first in the production as well as the consumption of both the commodities. The quantity and value of export are also worth mentioning in the selection of these two crops. Detailed analyses of the two crops have been given in the respective chapters.

Type of Data and its Source

- Directorate of Arecanut and Spices Development, Calicut.
- Directorate of Economics and Statistics, New Delhi.
- Indian Institute of Spices Research, Calicut and Spices Board, Cochin.
- Reserve Bank of India dataset.

The Growth of Export of Indian Spices

In their vision document, the Spices Board states that the growth in spice exports is remarkable but not exceptional, taking into account that India holds a deep-rooted history when it comes to spices. The demand for organic products in Western markets is steadily increasing by 20–25% every year, while the demand for organic spices is increasing by approximately 2%. Its medicinal properties have also been excavated. Value-added spices like encapsulated spices, oils and oleoresins are becoming increasingly prominent due to the ease of their convenience. With the increased use of spices, oils and oleoresins in soft drinks, food and medicines their demand will inevitably rise sharply. India has a headstart to become a pioneer in spice business bearing its large genetic base, varied soil and climatic conditions and skilled human power. Still, despite that spice crops, productivity in India is low. Yields of black pepper (260 kg/ha), small cardamom (174 kg/ha), ginger (3583

kg/ha) and turmeric (4382 kg/ha) are low compared to Malaysia (2925 kg/ha for black pepper) and Guatemala (250 kg/ha for small cardamom). Low productivity of spices primarily arises due to subdued soil fertility and low level of fertilizers and pesticides. These spices fare less on international platforms because of high costs and high levels of microbial contamination, including mycotoxins and toxic chemicals in the finished product. India has to make conscious efforts to maintain both cleaner products and make them available at competent prices. These are the two prime strategies to achieve a low cost per unit of production. Noteworthy strides are essential to enhance post-harvest processing and storage systems, and to educate farmers and traders in hygienic produce, while handling and processing the spices.

Table 1: GI of Export Production, Productivity and Area of Pepper

Year	GI of Export	GI of Production	GI of Productivity	GI of Area
1970–71	100	100	100	100
1971–72	7.111853	0.114679	0.194661	0.98626
1972–73	3.557471	9.583811	8.571561	1.602671
1973–74	36.93756	-1.81185**	-2.02377**	0.164312
1974–75	-16.7688**	-9.26189**	-1.25239**	-8.1939
1975–76	-8.73029**	-0.27376**	-0.73983**	0.276959
1976–77	-18.0202**	-17.2549**	-11.7036**	-6.71775**
1977–78	20.22215	1.895735	27.45955	-19.2264**
1978–79	-56.9947**	28.83721	-1.46647**	30.92113
1979–80	24.78228	6.462094	8.185637	-1.29155**
1980–81	26.15561	-0.88165**	-2.47402**	1.582944
1981–82	-27.9309**	-8.96339**	-8.7555**	-0.52243**
1982–83	8.78187	-14.6561**	-12.6834**	-2.7979**
1983–84	14.14217	-19.771**	-24.1302**	1.909641
1984–85	-1.44375**	86.60812	70.91776	14.36929
1985–86	32.42956	-7.82353**	-13.4772**	6.1461
1986–87	-1.42743**	53.44608	35.96759	12.8906
1987–88	9.577918	-8.17218**	-14.0767**	7.210031
1988–89	-11.1168**	24.97736	17.62826	6.650491
1989–90	-6.11791**	-13.1183**	-14.2641**	1.166657
1990–91	-15.5578**	8.467153	1.684968	6.209998
1991–92	-46.019**	-2.40338**	-4.15678**	2.81759
1992–93	16.00195	1.103231	-0.74624**	0.844818
1993–94	51.12939	3.487919	18.12633	2.544636
1994–95	-30.8045**	15.94803	-1.03664**	-1.43988**
1995–96	-29.2991**	-9.72718**	-0.81508**	-6.61555**
1996–97	44.98987	3.022126	-1.18451**	0.715633
1997–98	-33.3807**	-6.72254**	22.02839	22.86422
1998–99	-2.22241**	-1.95432**	-36.2155**	-9.30467**
1999–00	18.0156	1.592332	25.80551	5.129384
2000–01	-96.1704**	2.743845	-5.27154**	-2.43979**
2001–02	4.796152	28.04097	13.08398	7.926532
2002–03	-5.86793**	-7.14286**	-5.78507**	5.130839
2003–04	-29.3952**	-4.61538**	3.070147	13.45708
2004–05	-15.2814**	-19.3548**	-5.94782**	-3.69433**
2005–06	18.51639	0	3.161982	-8.1895**
2006–07	39.60696	0	-1.53335**	-15.7598**
2007–08	21.73913	-6.50986**	0.777781	-8.87483**
2008–09	-38.6139**	6.963151	-0.38092**	9.755707
2009–10	-27.8481**	-4	0.166251	-7.64174**
2010–11	-4.55696**	0.51741	-0.08299**	9.577212
2011–12	2.331606	0	6.92497	-1.1087**
(**the figures in the parenthesis shows a negative growth during the period				

The analysis which is shown in the table reveals that there has been negative growth in a few years. The pre-liberalization export shows a steady path with little negative growth, whereas in the post-liberalization period, it is evident that the growth has become negative in almost all the years. It shows that the impact of liberalization policies has a direct bearing on the export of Indian Pepper. Production of Pepper corresponding to the same years has shown negative growth, which is an explanation to the question of why export has decreased. In very few years, the export was positive but the total production was negative. We may not be able to explain it as a positive growth, as the value is very small. In the case of productivity as well, the situation is not different. In the post-liberalization period, the productivity has shown negative growth. In the case of pepper, there is a downward trend that has been visible from the analysis. To have a clear idea about the pattern of growth of export, production, productivity and area, a detailed structural break analysis has been done.

Structural Break Analysis

The concept of a structural break was popularized by David Henry and is widely used in econometrics. The analysis results from unexpected shifts in macroeconomic time series data. Breaks will lead to problems in the model and predictions. Chow test is applicable for a linear model with a single known break in the mean. Chow tests may still be appropriate if a single break in the mean is unknown. Conditions for which the Chow test is in-applicable includes the following:

- A known number of unknown breaks in the mean;
- An unknown number of (unknown) breaks in the mean;
- Break invariance.

For a nonstationary process, additional challenges arise. For a cointegration model, the Gregory and Hansen test (1996) is used for one unknown structural break and the Hatemi-J test (2006) is used for two unknown breaks.

R (open source) and GAUSS are two of the several programs that are used to determine structural breaks. An associated problem of structural break is testing the null hypothesis of structural stability against the alternative of a one-time structural break. In standard treatments, the location of the potential break is assumed to be known a priori. The standard approach is often highly unrealistic because of the endogeneity or sample selection, problem, that is, implicitly or explicitly, database procedures are typically used to determine the most likely location of a break, thereby invalidating the distribution theory associated with conventional tests. Structural breaks hold huge significance in subjects of associated literature, econometrics and economics.

In the present analysis, we make use of a more sophisticated model.

More Sophisticated Model

If there are surplus unknown breaks, then assume the parameter to be time-varying.

Multiple structural breaks can be automatically detected from data with the help of the latest method used by Bai and Perron (2003). The literature in this regard is colossal starting right from 1987 to 2010.

Model

$$Y_t = \alpha + \beta_1 (d_1t + d_1k) + \beta_2 (d_2t + d_2k) + \beta_3 (d_3t + d_3k) + \beta_4 (d_4t + d_4k) + u_t$$

Y_t = the natural log value of Area, Production, Productivity and Export of pepper and cardamom.

α = intercept

$\beta_1, \beta_2, \beta_3, \beta_4$ = Growth rate for the subperiods identified with structural break equation

k = Brake points

d_1 to d_n = Dummy Variable for 1 to n breaks.

u_t = error term

RESULTS AND INTERPRETATION

Table 2: Structural Break

Real GDP	REER	Inflation	Pdn	Pdty	Area	Export of Pepper
1986 1991 1997 1999 2003	1986 1990 1991 1996 2000	1987 1990 1991 1997 2000	1986 1990 1991 1998 2005	1987 1990 1992 1998	1988 1990 1991 1998	1986 1990 1991

Significant breaks have been found out for all the variables and cointegration has been estimated by taking the correlation among the residuals. The results are significant and the variables are highly cointegrated, which means there is a structural change that happened in these variables in those years.

The real GDP has the least influenced variable followed by production, inflation and REER. The productivity and area have been omitted because of strong multicollinearity.

CONCLUSIONS

Indian spice trade has made a niche for itself in the international markets owing to its quality and services. This attainment was due to several existing companies. The majority of them are families who have been in this respective business for years. The ancestral undertone to these products has also proved to be a defining factor in influencing its demand globally. In the past few years, black pepper and other markets have faced the brunt and privilege of such transformations. The normal cyclical challenges of the spice trade has been intensified majorly because of new regulatory laws in the overseas markets with regard to food safety, plant health and any disarray caused to the environment generated by production, preparation and trading of spices. All of these changes are brought up by producers, exporters, the Spices Board and the concerned government agencies. There are several challenges India faces. International commercial level competition in the export of bulk spices like cardamom and black pepper, that is very common in foreign cooking, has been on the decline because of their stunted yield at the domestic level. The exporters faced with continuous challenges when it came to withholding cost and accepting new technologies as per the emerging laws in this field, especially for shipment fumigation (against plant health risks) and product sterilization (against microbiological risks). It is predicted that the firm pioneering in domains like spice oils, oleoresins and dehydrated products has a reliable chance of a surge in sales if catered to overseas food and aroma business in the near future. For the very same analysis, the Spices Board intends to initiate financial support and work with other agencies to increase R&D activity to augment nutritional, pharmaceutical, cosmetic and other values of spices. The returns from these investments are considered to be fruitful on an average in the longer term. Also, expected growth potential is seen in packaged consumer products with the promotion of Indian or joint venture brand names. Flaring interests from countries like Africa, the CIS, Latin America and the Middle East is expected with

respect to these products. These are the two important sectors the spice industry is currently delving into. With such actions put into focus, India would soon be considered as a frontrunner in the export of spices and its derivative products.

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