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A Study Of Export Competitiveness Of Groundnut In India

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ABSTRACT

This paper combines policy analysis matrix techniques to model the analysis of profitability from groundnut farming. Policy analysis matrices are computed for a sample of cotton growers located in the garden land of the Tamil Nadu (Southern India) under observed conventional and profit-efficient farming conditions. In this study groundnut had been competitive for most of the period under consideration. EPC estimates showed that it was less than unity like DRC in the entire study period. However it could be seen that these had been an increasing trend in the values of EPC and DRC from 2003-04.Since NPC value are more than unity it indicates that the state resorted to protection at the state level. The estimates of DRC revealed that the state had comparative disadvantage in groundnut export. The main conclusion is that the usefulness of the policy analysis matrix might be substantially enhanced by simulating profitability after efficiency-improving managerial decisions have been adopted.

General Terms: CAP (common agricultural policy), c.i.f. (cost, insurance and freight), CMO (Common Market Organization), DEA (data envelopment analysis), Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), Effective Rate of Protection(ERP) and Domestic Resource Cost (DRC) f.o.b. (free on board), OECD (Organization for Economic Cooperation and Development), PAM (policy analysis matrix).

Keywords: Tamil Nadu groundnut growers, Policy Analysis matrix, NPC, EPC, ERP, DRC, Indian agricultural policy, multifunctionality.

1. INTRODUCTION

This paper evaluates the private and social profitability of farming systems by the use of the policy analysis matrix (PAM). Since the seminal work by Monke and Pearson (1989), the PAM has been widely

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employed to compute market-driven and social profits for a variety of farming systems under different technological and institutional scenarios. Here, it is shown that important additional insights might be obtained if the farmers' efficient behaviour is considered, in addition to their observed behaviour. This empirical application responds to the concern over whether or not those Tamil Nadu farming systems that can be deemed multifunctional, because of the important environmental functions performed, will be able to survive in the policy context of the post-2003 common agricultural policy (CAP).

The Uruguay Round of the GATT (1986-94) paved the way for an improvement in the access of third country exporters to the internal Indian market, and a further move in the direction of trade liberalization is currently envisaged, as a likely outcome of the Doha Round negotiations (Swinbank, 2005). Partial or total decoupling of agricultural support from current production levels has been the answer of Indian policy-makers to the criticisms raised by foreign competitors concerning the so-called trade-distortion effects of the CAP.

For Indian authorities, the political problem of supporting farmers' incomes in an increasingly open economic environment has been further compounded by the need to take on board the impact of trade liberalization on the non-commodity outputs of Indian agriculture. There is a growing recognition that, beyond its primary function of supplying food and fibre, agriculture can provide environmental benefits and contribute to the sustainable management of renewable natural resources, as well as to the preservation of biodiversity, and the maintenance of the economic viability of less favored rural areas. These new concerns are frequently summarized under the heading of multifunctional agriculture and have become an integral part of the Indian model of agriculture (EC, 1999, 2000). The research concerning the multifunctional character of agriculture is no longer restricted to international trade policy.

Usually, the analysis of farming systems has attempted to assess farms' viability by dealing with actual farmers' behaviour, implicitly assuming that all farmers behave efficiently. But, one could legitimately ask: what would happen if the current farming practices of some individual farmers were inefficient when compared to best practices under presently available technologies? The answer to this question has important economic policy implications. The impact of agricultural policies on farmers' income might be widely different under observed and efficient behaviours. Likewise, the assessment of private and social profitability for a particular farming system can change substantially after major input adjustment decisions have been adopted in response to the diffusion of best management procedures. Profits obtained after all those adjustments could provide a useful benchmark for current production practices, showing whether enough room exists for an improvement in farms' financial situation.

In this paper efficiency is used in connection with the PAM, refers to a social benchmark for the calculation of costs and revenues based on the adoption of international prices and the removal of the effects of subsidization and taxation.

2. DATA AND SAMPLE: THE SOUTHERN INDIA

The study relied on secondary data pertaining to export of major agricultural commodities in Tamil Nadu. The secondary data included production of the groundnut in Tamil Nadu and India, export and import prices, domestic wholesale and world market prices for the periods between 1994-95 and 2008-09 at district and state level. These data were collected from various issues of Seasons and Crop Report of Tamil Nadu, Agro Stat published by different sources and web database of Food and Agriculture Organization and IndiaStat. Value of export of agricultural commodities through Chennai and Tuticorin ports was also collected from the custom houses (Sea Cargo) for the periods of ten years (1999-2000 to 2008-09).

The price data are monthly quotations for nominal spot price (US $/metric ton) for groundnut were collected from UNCTAD website. The data span from January 1994 to December 2010 was collected. The dataset used in this paper corresponds to a sample of 337 single crop groundnut farms located in the Tamil Nadu districts. The data were collected from a comprehensive survey carried out by the authors with support from the Tamil Nadu Ministry of Agriculture and correspond to the year 2010. The dataset provides data for one output and seven inputs. Output is measured in kilograms of groundnut production. The only fixed input is cultivated land, measured in hectares. Variable inputs are: labour (working days), in addition to capital, fertilisers, seeds, herbicides and fungicides, all of which are measured in Indian rupees.

3. CONSTRUCTION OF THE PAM FOR GROUNDNUT CULTIVATION

The Policy Analysis Matrix: Theoretical Aspects

PAM is essentially a double-accounting technique that summarizes budgetary information for farm and post farm activities. While simple to use, it is theoretically rigorous and derived from social cost-benefit analysis and international trade theory in economics. The basic steps in using the PAM method are identifying the commodity system, assembling representative budgets for each activity in the system, calculating social values, aggregating the budgetary data into a matrix, analyzing the matrix and simulating policy changes. The method rests upon a familiar identity: Profit = Revenue – Costs. For reasons that will soon be apparent costs are divided into those inputs that are traded on international markets (fertilizers, pesticides, hybrid seeds) and those domestic factors (labour, land, and capital), which are not traded internationally.

In the Ricardian one-factor-two good model, countries will export goods that their labour produced relatively efficiently and imports good that their labour produced relatively inefficiently. In other words, a country's production pattern is determined by comparative advantage. Samuelson (1971) and James (1971) postulated in their Specific Factor Model that differences in resources would cause countries to have different relative supply curves, and thus would result in international trade. In this model, factors specific to export sectors in each country would gain from trade, while factors specific to import sectors would lose. Mobile factors that can work in either sector may either gain or lose. One of the most influential theories of international economics developed by Eli Heckscher and Bertile Ohlin often referred as Heckscher – Ohlin (Factor-Proportions) theory showed that comparative advantage is influenced by the interaction between nations' abundance of resource intensity (Technology) used in the production of different goods. In other words, countries tend to export goods that were intensive in the factors with which they are abundantly supplied (Krugman and Obstfeld, 2004).

However, trade can be resulted from economies of scale (internal-within the firm or external-within the industry), imperfect competition and difference in technology. Dumping is a profit maximizing (imperfect competition) strategy that occurred when export sales were more price responsive than domestic sales. Furthermore, international factor movements, trade policy instruments (like tariffs, quotas, subsidies and trade restrictions), macroeconomics and controversies in trade policies among countries would also greatly influence the trade participation and benefits.

Measures of Competitiveness

Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), Effective Subsidy Coefficient (ESC) and Domestic Resource Cost (DRC) are the indices used in the computation of the trade competitiveness of commodities. These indices are calculated either under exportable hypothesis or under importable hypothesis depending upon whether the commodity under consideration is treated as an exportable or an importable item. Under exportable hypothesis, the domestic good would compete at foreign port. Under importable hypothesis, the competition is supposed to be taking place at domestic port. Border price under the exportable hypothesis is Free On Board (FOB) price, net of the transportation costs (both domestic and international), port clearance charges, marketing costs, traders' margin and processing costs necessary to make the commodity tradable. Under importable hypothesis, the relevant border price to be compared to farm gate price is Cost, Insurance and Freight (CIF) price at out port plus the domestic transport cost, port charges, handling cost etc. Four different cases and the suitable measure of competitiveness for application to each category (Datta, 2001) is furnished in the following Table.1.

Table:1 Competitiveness Measures of Agricultural Export

Whom	What
Exclusive exporter / importer de-linked from agro-processing and farming	NPC
Exporter / Importer engaged in value-addition through agro-processing	EPC, ESC, DRC
Exporter / Importer engaged in agro-processing of main product and also backwardly integrated with farming activities	DRC
Exporter / Importer engaged in agro-processing of main product as well as byproducts and also backwardly integrated with farming activities	DRC

Though the aforesaid measures of competitiveness are theoretically sound these measures lack in few fronts, which are also crucial for export of commodities. These measures concentrated only on the price or resource use and not the quality dimension. There can be several varieties of same commodity and usage of wide range of input mix for cultivation. There are lot of difficulties in estimating the shadow prices and adjustments for CIF or FOB which would raise possibilities of running into error by different researchers. Policy instruments like exchange rates and tarification were also not considered in calculations. Ministry of Commerce and Industry (2001) opined that participation of Indian farmers is very marginal. On the other hand, selective extension of high domestic support and export subsidies to a few commodities in the developed countries has not only eroded the competitiveness of products originating in developing countries but had also introduced an unfair competition for local producers. Evidences indicated that the international agricultural markets were imperfectly competitive in structure (Deodhar, 2001). As reported by Gill and Brar (1996), the trade in agricultural commodities was dominated by a few multinational companies and trading agencies. Empirical studies of Deodhar and Sheldon (1995) also indicated that multinational firms enjoyed a certain degree of market power in the agricultural export markets. It would therefore be appropriate to consider a measure to assess the competitiveness of agricultural commodities in traders' perspective instead of farmers' resource use efficiency.

Nominal Protection Coefficient (NPC)

The Net Protection Coefficients were estimated for selected agricultural commodities under exportable hypothesis for the period from 1996-97 to 2008-09 in order to measure the extent to which domestic prices diverge from border equivalent prices. It was estimated as follows.

NPC = P_d/P_b

Where,

P_d = the domestic producer price; and

P_b = the border equivalent producer price computed as explained below.

Border equivalent prices or world prices adjusted for transport, marketing and processing costs, were estimated to serve as yardstick to indicate the extent to which domestic prices have been distorted by the various government interventions. The border equivalent producer price at the farm gate was derived by deducting ocean freight and insurance charges from the world price to obtain f.o.b. border price. From the latter, transport, processing and marketing charges from the farm to the domestic market were deducted and the value of by-products was added to arrive at the border equivalent producer price. Algebraically,

$$P_b = P_w - T_w - T_d - C_d + V_b$$

Where,

Pb = Border Price

Pw = World Price

Tw = Ocean freight and insurance charges

Td = Handling, transport and marketing charges from port to domestic markets
Cd = Transport, processing and marketing charges farm gate to domestic market
V_b = The value of by-products.

An NPC greater than one would show that the domestic market price of the commodity exceeded the border price, which discouraged the export of that particular commodity.

Effective Protection Coefficient (EPC)

In the present study, Effective Protection Coefficient (EPC) was estimated as the ratio of value added in private prices to value added in social prices. The EPC indicates the combined effects of policies in the tradable commodities markets.

$EPC = VP_d / VP_b$

Where,

VP_d = the value added in domestic price (private price)
VP_b = the value added in border price (social price)

An EPC greater than one would indicate positive incentive effects of commodity policy (an export subsidy to producers), whereas an EPC less than 1 shows negative
incentive effects (a tax on producers). Both the EPC and the NPC ignored the effects of transfers in the factor market and therefore do not reflect the full extent of incentives to farmers.

Domestic Resource Cost (DRC)

To measure the comparative advantage (or) efficiency of Indian agricultural commodities in the world market, domestic resource cost coefficient was estimated as given below.

$DRC = SP_d / VP_b$

Where,

SP_d = the shadow price of the agricultural commodities; and
VP_b = the value added measured at world prices.

DRCs greater than one would indicate that the value of domestic resources used to produce the commodity exceeded its value added in social prices. Production of the commodity, therefore, does not represent an efficient use of the country's resources. DRCs less than one would imply that a country has a comparative advantage in produce in the commodity. Values less than one would mean that the denominator (value added measured at world prices) exceeded the numerator (the cost of the domestic resources measured at their shadow prices).

DRC, the most useful indicator of the three, is used to compare the relative efficiency or Comparative advantage between agricultural commodities and defined as the shadow value of nontradable factor inputs used in an activity per unit of tradable value added (F/(D-E)). The DRC indicates whether the use of domestic factors is socially profitable (DRC<1) or not (DRC>1). The DRC values were calculated for each commodity in each State. The commodities have been ranked according to the DRC values and this ranking was taken as an indication of comparative advantage or disadvantage within that State. A state will have a comparative advantage in a given crop if the value of the DRC for that crop is lower than the DRC for other crops grown in that state. Although the DRC indicator is widely used in academic research, its primary use has been in applied works by the World Bank, the Food and Agriculture Organization, and the International Food Policy Research Institute to measure comparative advantage in the developing countries. However, DRC was found to be biased against activities that relied heavily on domestic nontraded factors such as land and labor. A good alternative to the DRC would be the Social Cost/Benefit (SCB), which accounted for all costs (Fang and Beghin, 1999).

Effective Rate of Protection (ERP)

To measure the structure of protection like tariffs, import bans, quantitative restrictions on Indian rice exports, Effective Rate of Protection coefficient was estimated, which measured the percentage increase above value added in world prices that was permitted by the structure of protection.

$$EPC = VAD_p / VAB_p$$

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$$ERP= (VAD_p- VAB_p)/VAB_p$$

Where,

VAD_p = Value added at domestic price VAB_p = Value added at border price

ERP = EPC – 1 or EPC = ERP +1

Greater the ERP, higher would be the protection for that commodity to be traded in the world markets and vice versa.

Since the seminal work by Monke and Pearson (1989), the PAM approach has been widely used. It has been applied to studying the profitability of maize cultivation in Portugal, before this country joined the Indian Community (Fox et al., 1990), and also in various developing countries (Nelson and Panggabean, 1991; Pearson et al., 1995; Adesina and Coulibaly, 1998; Fang and Beghin, 2000). The possibility of incorporating environmental considerations into the PAM has opened new perspectives for the analysis of farming in areas of high ecological value (Kydd et al., 1997; Pearson et al., 2003). The results of PAM analysis are always contingent to a specific set of output and input prices and input/output technical coefficients, but matrices can be updated to incorporate both technological and price changes.

In this paper, the PAM methodology is employed in order to learn about the possibilities of maintaining groundnut cultivation in the Tamil Nadu groundnut growers.

4. RESULTS AND DISCUSSION

Details of the Competing Countries

Details of competing countries and their average market share along with the growth rate for the selected agricultural commodities for the period from 2000-01 to 2009-10 are furnished in the Table 2. As mentioned elsewhere, the details were collected from the website of Food and Agricultural Organization and growth rate was worked out country wise.

Table 2. Competing Countries and their Average Market Share

Commodity	Major Exporting Countries	Quantity (tonnes)	Per cent to Total	CGR (per cent)
Groundnut	China	258913	23.12	-2.6*
	India	**193424**	**17.27**	**1.9***
	USA	165841	14.81	1.1*
	Argentina	140852	12.58	1.2
	Netherlands	75218	6.72	-0.2
	Nicaragua	66212	5.91	1.7
	World	1119783	100.00	0.3**

*- Significant at ten per cent level; **- Significant at five per cent level;
***- Significant at one per cent level

Source: www.fao.org/crop/statistics/en/

China was found to be a direct competitor for groundnut export for India. While China accounted for 23.12 per cent of the groundnut export at the world level, India shared 17.27 per cent of the world export. However India's export of groundnut exhibited a positive growth rate (1.1 per cent per annum), while China witnessed a negative growth (-2.6 per cent per annum) in its export of groundnut USA and Argentina together accounted for 27.39 per cent of the world's groundnut export and both these countries witnessed almost similar growth rate of around 1.2 per cent per annum. The world export of groundnut had increased marginally at the rate of 0.3 per cent per annum.

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5. EXPORT COMPETITIVENESS

Trade competitiveness of the crops was analyzed using the framework of Policy Analysis Matrix. As mentioned elsewhere, the PAM was constructed taking into consideration of free on board prices. Similarly, for domestic factors which are not internationally traded social cost was calculated using the value of marginal product approach using factor shares of various inputs alongwith the mean values of inputs, output and prices.

Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), Effective Rate of Protection (ERP) and Domestic Resource Cost (DRC) computed to reveal the trade competiveness. Trade competitiveness was estimated using the aforesaid measures for groundnut for the period from 2000-01 to 2009-10.

Groundnut

Tamil Nadu is one of the major Ground nut producing states in India. The Various measures of trade competitiveness for groundnut are furnished in Table. 3.

Table.3 Competitive Measures for Groundnut

Year	NPC	EPC	ERP	DRC
2000-01	1.01	0.09	-0.91	0.08
2001-02	0.97	0.09	-0.91	0.08
2002-03	0.97	0.09	-0.91	0.08
2003-04	1.21	0.18	-0.82	0.16
2004-05	1.16	0.13	-0.87	0.11
2005-06	1.05	0.17	-0.83	0.15
2006-07	1.17	0.12	-0.88	0.11
2007-08	1.07	0.18	-0.82	0.17
2008-09	1.12	0.20	-0.80	0.18
2009-10	0.80	0.22	-0.78	0.20
Average	1.05	0.15	-0.85	0.13

As regards NPC, the estimate ranged from 0.80 in 2009-10 to 1.21 in 2003-04 with an average of 1.05 for the study period under exportable hypothesis. EPC estimates showed that it was less than unity like DRC in the entire study period. However it could be seen that these had been an increasing trend in the values of EPC and DRC from 2003-04.

A relatively better performance of groundnut crop in the pre WTO period might be due to expansion in area, availability of improved oilseed production technology and its adoption, remunerative support prices and institutional support, particularly establishment of Technology Mission on Oilseeds (TMO) in 1986 as suggested by Hegde (2004). But the production started declining after the establishment of WTO due to decrease in area under cultivation, which could be attributed to import of edible oils and relatively stagnant real prices of groundnut. These factors acted as disincentives to the producers to expand area under the crop (Deshpande, 2004). Currently India is the largest importer of edible oil in the world and more than 40 per cent of domestic demand is met through imports (Chand *et al.*, 2004). All these factors resulted in stagnation in domestic groundnut production in recent years, which could be partly attributed to WTO obligations.

Groundnut showed a clear-cut competitive disadvantage in the pre WTO period because NPC and DRC were more than one. NPC was more than unity in the pre WTO period indicating that the domestic prices of groundnuts were more than import prices, which signify that groundnut, received a significant protection from the state. The level of DRCs showed that costs involved in import of groundnut was lesser than the value of domestic resources used in producing one-hectare of groundnut area. These results support the findings of Ravi and Reddy (1998) and Reddy *et al.*, (1998).

In the post WTO period, the competitiveness of groundnut improved significantly as supported by the estimates of NPC and DRC, which turned out to be less than one. However results are in contradiction with the results of Reddy *et al.*, (1998), Ravi and Reddy (1998) and Gulati (2002). Under exportable hypothesis it is assumed that Indian groundnut would compete with US groundnut in Europe (Rotterdam). The NPC's were above unity in the pre WTO period that relatively groundnut was not an efficient export crop. But during post WTO the magnitude of state subsidy in the form of fertilizer subsidy has come down drastically due to decontrol of phosphatic fertilizers and real prices of groundnut by and large have remained constant during this period. Perhaps these factors might be rendering groundnut competitive internationally in the post WTO period (Ragavendra, 2006).

From the foregoing discussion, it is evident that groundnut was found to be disadvantage and efforts have to be taken to avert the situation. The measures will be taken by the Government are in the desired direction.

6. CONCLUDING REMARKS

An efficient PAM has been built on the basis of this information, yielding new estimates of private and social profitability. Now, farms are made negative profits and the society also obtains a net welfare gain from the resources allocated to groundnut production. It could be argued, with regard to the lack of social profitability of groundnut farms with observed data, that social profitability is too narrowly defined in the PAM context, because it does not include a direct appraisal of the worth of the positive environmental externalities that stem from groundnut cultivation. The PAM methodology could be extended by including the valuation of the public goods (landscape and biodiversity among them) jointly produced with the private or commercial output in the social row of the matrix. A trade-off could then arise between negative economic returns and the production of non-commercial, i.e. multifunctional, outputs. However, this line of thinking has not been pursued in this paper.

The lack of relevant empirical information that could be used for widening the scope of social efficiency prevents us from providing a sound justification of private and social losses grounded on society's quest for non-commodity outputs from agriculture. But differences between private and social profits per hectare can be used to establish a lower threshold for the valuation of the annual supply of public good services jointly produced with groundnut output. Instead of pursuing a line of analysis that concentrates on the construction of an environmental PAM, the possibilities offered by computing a virtual PAM, assuming profit maximization on behalf of farmers, is explored. This helps to assess whether there is a way out of the current financial difficulties of pulse growers are experiencing that could allow the valuable non-commercial functions currently performed by this farming system to be maintained. The findings point to a negative outcome, both in terms of private and social profits, after farmers should be adopt the best practices of efficient farms.

Finally, it is worth highlighting a couple of the conclusions of this research. On the one hand, it vindicates the potential of the policy analysis matrix to yield fruitful information about particular groundnut cultivation. Furthermore, the usefulness of this methodological approach may be substantially enhanced if the analyst can simulate the profitability of the system after all sorts of efficiency-improving changes have been adopted by farmers. On the other hand, the results of this research lead to a noteworthy conclusion in terms of economic policy. In order to preserve the nonmarketable function of the Tamil Nadu groundnut system linked to the protection of biodiversity and the environment, local and regional authorities need to make a greater effort to spread the adoption of best practices among groundnut growers, helping them to improve their profit efficiency and financial viability.

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8. REFERENCES

[1] Adesina A.A., Coulibaly O.N., 1998. Policy and competitiveness of agroforestry-based technologies for maize production in Cameroon. An application of policy analysis matrix. Agr Econ 19, 1-13. doi:10.1016/S0169- 5150(98)00051-6.

[2] Datta, S.K., 2001. How to Judge Global Competitiveness of Indian Agribusiness: Methodological Issues and Lessons for India. In S.K.Datta and S.Y.Deodhar (Eds), Implications of WTO Agreements for Indian Agriculture. Oxford and IBH Publishing Co.Pvt.Ltd, New Delhi.

[3] Deodhar, S.Y and Sheldon., 1995. Is Forieghn Trade perfectly competitive?: An Analysis of the German Market for Banana Imports. *Journal of Agricultural Economics*. Vol. 46 (3): pp.336-348.

[4] Deodhar, S.Y., 2001. WTO Agreements and Agriculture: Retrospection and Prospects. CMA Monograph No.191. Oxford and IBH Publishing Co.Pvt.Ltd, New Delhi.

[5] EC, 2000. Agriculture's contribution to environmentally and culturally related non-trade concerns. Indian Commission International Conference on Non-Trade Concerns in Agriculture, Ullensvang, Norway, July 2-4. Discussion Paper Four.

[6] Eli Heckscher and Bertile Ohlin., 1972. Ödeläggelsen Av 1800-Talets Hushållning. Stockholm: Bonniers.

[7] Fang C., Beghin J.C., 2000. Food self-sufficiency, comparative advantage, and agricultural trade: a policy analysis matrix for Chinese agriculture. Working Paper 99-WP 223, Center for Agricultural and Rural Development and Department of Economics, Iowa State University, USA.

[8] Fox R., Finan T., Pearson S., Monke E., 1990. Expanding the policy dimension of farming systems research. Agr Syst 33, 271-287. doi:10.1016/0308-521X(90)90053-S.

[9] Gill and Brar., 1996. Economic Development and Structural Change in Punjab: Some Policy Issues. Principal Iqbal Singh Memorial Trust, Ludhiana.

[10] Gómez-Limón J.A., Riesgo L., Arraiza M., 2004. Multi-criteria analysis of input use in agriculture. JAgr Econ 55, 541-564. doi:10.1111/j.1477-9552.2004. tb00114.x.indonesia/newregional/newbook.htm [4 October 2007].

[11] Krugman Paul and Maurice Obstfeld., 2004. International Economics: Theory and Policy. Pearson Education (Singapore) Pvt. Ltd, New Delhi.

[12] Kydd J., Pearce R., Stockbridge M., 1997. The economic analysis of commodity systems. Extending the policy analysis matrix to account for environmental effects and transactions costs. Agr Syst 55, 323-345. doi:10.1016/ S0308-521X(97)00013-9.

[13] Ministry of Commerce and Industry, 2001. India's Proposals on Agriculture-I: Food Security. India and the WTO, Vol.3 (1): pp.2.

[14] Monke E., Pearson S., 1989. The policy analysis matrix for agricultural development. Cornell University Press, Ithaca, New York.

[15] Nelson G.C., Panggabean M., 1991. The costs of Indonesian sugar policy: a policy analysis matrix approach. Amer J Agr Econ 73, 703-712. doi:10.2307/1242822.

[16] Pearson S., Gotsch C., Bahri S., 2003. Applications of the policy analysis matrix in Indonesian agriculture. Available on line in http://www.stanford.edu/group/FRI/

[17] Pearson S., Monke E., Argwings-Kodhek G., Avillez F., Mukumbu M., Pagiola S., Sellen D., Winter-Nelson A., 1995. Agricultural policy in Kenya. Applications of the policy analysis matrix. Cornell Univ Press, Ithaca, NY, USA. 328 pp.

[18] Prahadeeswaran., 2007. Potential of Change in Cropping Pattern Towards Export Orient Commercialization of Agriculture: Assessing Food and Nutritional Security in Tamil Nadu, PhD Thesis, Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore.

[19] Reddy, B. D. R., Lalith Achoth and B. V. Chenappa Reddy., 1998, Export Competitiveness of Groundnut Empirical Evidence from Karnataka. *Astha Vijnana*, Vol.15 (3): pp. 263-270.