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Trade Performance of Indian Cashew Sector under Policy Analysis Matrix (PAM) Framework

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The objective of the study is to evaluate the trade performance of the Indian cashew sector. This study uses Monke and Pearson's [1] Policy Analysis Matrix (PAM).
Study Design and Methodology: Private and social prices are taken for studying PAM, while private prices of tradable and non-tradable inputs serve as domestic price and social price is the international price of Vietnam which is a major competitor to India in cashew trade.
Results and Conclusion: Despite the distortions, the cashew nut industry is financially and commercially lucrative, according to this study (net margin, financial and economic profit are greater than zero). It is, however, inadequately protected at the producer level and vast scope for encouraging the export of cashew from India in future. This study suggests that Indian cashew sector was highly competitive in trade when it re-exports the processed cashew kernels to other countries. Since domestic cashew production and processing is labour intensive, appropriate technology for cashew processing is a must.

Keywords: Cashew; trade performance; policy analysis matrix.

ABBREVIATIONS

PAM : Policy Analysis Matrix
NPC : Nominal Protection Coefficient

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DRC : Domestic Resource Cost
EPC : Effective protection coefficient
PP : Private profit
PC : Profitability Coefficient
PCR : Private Cost Ratio
TIVp : Value added by tradable inputs at private prices
TIVs : Value added by tradable inputs at social prices
DIPp : Domestic inputs price at private prices

1. INTRODUCTION

India's agricultural export potential is relatively significant in cashew trade. Agricultural exports have remained India's economic backbone and will continue to be the cornerstone for future export growth. Agricultural exports account for approximately 19.18 per cent of India's overall export revenues and play an important role in job creation, particularly in rural areas (DGCIS, 2021). The cashew sector in India is nearly entirely focused on export. India is one of the finest cashew nut producers and exporters in the world, with a larger market share [2-5]. India does not produce enough raw cashew to meet export demand, thus it must import 5.33 thousand metric tonnes of raw cashewnuts each year. India is the world's largest importer of raw cashew nuts, with imports increasing gradually to 0.83 million tonnes valued at Rs. 7491.21 crores in 2020-21. In 1990-91, it imported only 0.082 million tonnes worth Rs. 134.00 crores. Total cashew kernel and Cashew Nut Shell Liquid (CNSL) export profits have climbed from Rs. 447.80 crores in 1990-91 to Rs. 3578.9 crores in 2020-21 (World Integrated Trade Solution, 2021). In the export of cashew kernels, India faces stiff competition from Vietnam and Brazil. The purpose of this study is to use a Policy Analysis Matrix to analyses the export competitiveness and trade performance of Indian cashewnut sector [6,7].

This study aims to determine the competitive and comparative advantages of cashew nut of India in the international market at 2018 prices. PAM has been used for this study which shows the economic and financial performance of cashew trade using factors prices (tradable and non-tradable). Tradable factors are Planting material, fertilizer, plant protection chemical and non-tradable are land, labour, capital, irrigation etc [8-10].

Estimating social price for outputs, as well as deconstructing inputs into tradable and non-tradable components, are the most difficult tasks in building PAM [11-13]. World prices are utilised as the study's reference prices for computing social price. Using Vietnam as a competitive and reference market, these global prices were calculated.

2. METHODOLOGY

2.1 Policy Analysis Matrix (PAM)

Monke and Pearson [1] developed the Policy Analysis Matrix (PAM) as a standard tool for analysing private and economic profitability, social efficiency, and policy transfers. The PAM is the result of the merging of two accounting identities. The difference between sales and costs is defined as profitability in the first. The gap between observable financial prices and social prices that would exist if the divergences were removed is how the other measures the effects of divergences (market failures). It is possible to measure both the level of policy effects and the activity's intrinsic economic efficiency (or comparative advantage) by filling in the elements of the PAM.

The PAM consists of three rows. The first row is evaluated using the actual (market) prices encountered by the production system. The second row is evaluated the social profitability measured at shadow prices or social prices. The divergences or market failure is measured in the third row, for which each entry is calculated simply by the difference between its value in the first row and the second row. The basic framework for Policy Analysis Matrix is presented in Table 1.

Where,

A= Revenue obtained by production of value-added product at current prices;

B= Tradable input cost incurred in the whole series of value chain at current prices;

Tradable inputs cost included the cost incurred in transportation, wages, electricity, cold storage and other costs like packing charges, preservatives, building rent, *etc.*

Table 1. Basic framework of a Policy Analysis Matrix (PAM)

Indicators	Revenues	Input cost		Profit
		Tradable goods	Non-tradable goods	
Private prices	A	B	C	D =A-B-C
Social prices	E	F	G	H =E-F-G
Net transfers	I =A-E	J =B-F	K =C-G	L =D-H=I-J-K.

C= Non-Tradable input cost incurred in the whole series of value chain at current prices;

Non-Tradable inputs cost included the cost incurred on the domestic factors at current prices. For present study, imputed value of labour in custard apple processing was considered as non-tradable input cost.

E= Revenue obtained by production of value-added product at social prices/ shadow prices. Revenue at social prices included the revenue foregone which could have been obtained if the value-added product fetched highest alternative prices in the market. The value of the products was taken from various websites like indiamart.com, etc;

F= Tradable input cost incurred at social prices;

Tradable input cost included the opportunity cost of transportation, wages, electricity, cold storage and other costs like packing charges, preservatives, building rent, *etc.*

G= Non-Tradable input cost incurred in the whole series of value chain at social prices;

Non-Tradable inputs cost included the cost incurred on the domestic factors at social prices. For present study, imputed value of labour in custard apple processing was considered as non-tradable input cost.

D (Private Profit) = A - B –C
H (Social Profit) = E - F - G
I (Output Transfer) = E-A
J (Input Transfer) = F-B
K (Factor Transfer) = G-C
L (Net Policy Transfer) = I - J - K = H - D

2.2 Method of Data Collection

Trade performance is analyzed using secondary data collected from various sources, the price of tradable and non-tradable inputs in cashew trade for India and Vietnam was taken for 2018. The data are collected from Indiastat, Cashew Export Promotion Council, reviewed literature, DGCIS,

2.3 Method of Data Analysis

In attempt to address the trade performance of Indian Cashew sector Policy Analysis Matrix approach is used.

2.3.1 Financial indicators

The data entered in the first row of the PAM measured a production system's private profitability. The term "private" refers to observed revenues and costs reflecting actual market prices received or paid by collector, traders and processors in the cashew trade. These private (or actual) market prices would thus incorporate the underlying economic costs and valuation plus the effects of all policies and market failures. In the PAM, private profits (D) were measured as the difference between revenues (A) and costs (B+C). It measured the degree of competitiveness of cashew with present technologies, output and input at actual prices.

2.3.2 Economic indicators

The second row of the PAM used social prices or shadow prices. The shadow price or social prices was the value of profit foregone by society in using the inputs resources for production of value-added product. These valuations were used to measure comparative advantage or economic efficiency. Efficient outcomes would be achieved when an economy's sources used in activities that create the highest levels of output and income equal to their opportunity costs. Social profits (H) were efficiency measures because outputs (E) and inputs (F+G) were re-valued in prices that reflect scarcity values and opportunity costs. In this respect, social profits (H) represented the total net revenue generated. The comparative advantage/ efficiency could be reflected by the social profitability. Positive social profitability indicated the efficient use of scarce resources.

2.3.3 Policy transfers

Transfers are shown in the third row of the PAM. If market failures are unimportant, these transfers measure mainly the effects of distorting policy.

The difference between the private and social value of revenues, costs (both tradable and domestic factors) and profits could be explained by the policy interventions. The output transfer (I) can be either positive or negative. Private price of output greater than that its social prices indicate a positive transfer provided by the policy which would cause the production system to realize higher private profits than it could attain without the aid of the policy. A divergence in tradable input prices (J) and domestic factor prices (K) can be either positive (causing an implicit tax or transfer of resources away from the domestic system) or negative (causing an implicit subsidy or transfer of resources in favour of the domestic system).

2.4.4 Net policy transfer

The net transfer is the difference between private and social valuations of revenues and costs. It represents the sum of output, tradable inputs and factor transfers. It is therefore an overall measure of the difference between private and social profits and it measures the overall effects of all policies

2.3.5 Ratio indicators

Where,

Pp = Private Profit
Ps =Social Profit
OPp = Revenue at private prices,
Ops = Revenue at social prices
TIVp = Value added by tradable inputs at private prices
TIVs = Value added by tradable inputs at social prices
DIPs= Domestic inputs price at social prices
DIPp= Domestic inputs price at private prices

2.3.6 Profitability coefficient (PC)

Profitability coefficient was calculated by taking the ratio of private profit and social profit. Private profit was profit incurred in production of value added product at current price on the other hand social profit was computed on the basis of revenue and total cost incurred at shadow prices or social cost. The PC measures the impact of all policy transfers on profitability level. The PC>1 indicated the profitable effect of policy transfer on the other hand PC<1 indicated the non-profitable effect of policy transfer on the value chain.

$$PC = Pp/Ps$$

2.3.7 Nominal protection coefficient (NPC)

It was calculated for both inputs and outputs. The nominal protection coefficient on inputs and outputs was calculated by taking their ratios at private prices to the social prices. The private price was computed at actual/ current prices/ market prices whereas the social prices were the opportunity cost foregone for the production of value added product. NPC (O) >1indicated implicit nominal protection and comparative advantage. On the other hand, NPC (I)<1 indicated that how much private prices of tradable inputs were varying from their social prices. If NPC (O)<1 indicated lesser comparative advantage. Further, NPC(I)>1 indicated input prices used was more than their comparable opportunity prices which further showed lesser comparative advantage and vice-versa.

$$NPC = OPp / Ops$$

2.3.8 Effective protection coefficient (EPC)

Effective protection coefficient is the measure of ratio of value added at private price to the value added at social prices. Greater than unity value of EPC served as the measure of effective value chain. Also, the present policies were providing incentives to the actors of value

Table 2. Ratio Indicators based on Policy Analysis Matrix (PAM)

Profitability Coefficient (PC)	D/H	Pp/Ps
Nominal Protection Coefficient (NPC)	B/F	OPp / OPs
Effective Protection Coefficient (EPC)	(A-B)/(E-F)	TIVp /TIVs
Domestic Resource Cost (DRC)	G/(E-F)	DIPs/ TIVs
Private Cost Ratio (PCR)	C/(A-B)	DIPp/ TIVp

Table 3. Consequence of Indicator

Indicator	Consequence			
NPC	<1	Export competitive	>1	Protected at domestic level
EPC	<1	Export competitive, the actors of value chain were not protected through policy intervention	>1	Not export competitive, policies were providing incentives to the actors of value chain
DRC	<1	Efficient use of domestic resources	>1	Inefficiency use of domestic resources
PCR	<1	Cashew trade is competitive	>1	Cashew trade is less competitive

chain at private prices while less than one value of EPC indicated that actors of value chain were not protected through policy intervention on value addition. EPC is an improvement over NPC to the extent that it takes care of variation in domestic and international prices of tradable inputs

EPC= TIVp /TIVs

2.3.9 Domestic resource cost (DRC)

The domestic resource cost ratio was introduced by Bruno in 1972 for measuring the comparative advantage. It was used to measure the efficiency of utilization of domestic factors in the system analysis at their shadow prices. The index was calculated by measuring the ratio of social costs for non-tradable inputs to the tradable value added. Further DRC indicated whether the usage of non-tradable domestic resources was socially profitable or not. If the value of DRC<1 then the channel used the domestic resources efficiently thus possess comparative advantage and if DRC>1 then value of domestic resources used in production exceeded its value added at social prices further indicating the inefficiency in use of domestic resources.

DRC= DIPs/ TIVs

2.3.10 Private cost ratio (PCR)

Private cost ratio is the ratio of non-tradable factors to the tradable value added at private/c current prices. This ratio measure served as the indicator of competitiveness of system. The value chain developed is competitive if the PCR<1 and it was less competitive if the PCR>1. Therefore, PCR indicated whether the use of non-tradable inputs was privately / currently profitable or not.

PCR= DIPp/ TIVp

3. RESULTS AND DISCUSSION

India's cashew industry exports cashew kernels to over 60 nations around the world. Cashew is India's second-largest dollar generator and one among the country's top foreign exchange earners. India held a virtual stranglehold on both cashew kernels and cashew nut shell liquid (CNSL) supplies until recently. Because domestic cashew nut production is insufficient to meet the country's export and domestic demand, the industry also imports cashew nuts from other nations. However, as domestic industries emerge in some East African nations, India will increasingly face severe competition in her export market from these sources. Despite having a virtual monopoly in the cashew trade, delivering more than 90 per cent of global demand, India is strongly reliant on raw cashew imports from other countries. Based on PAM, an attempt is made to analyse the trends of India's efficient cashew product exports to the world market.

Table 3, the PAM matrix measured in 2018 prices.

The first row of data shows a measure of private profitability (D), which is defined as the difference between observable revenue (A) and costs (B+C) assessed at current market values. The private profit of Rs.315420 demonstrates a cashew trade competitiveness in terms of current technology, production, and inputs valued at current market prices.

The social profitability is calculated at social pricing that reflect social opportunity costs in the second row of the matrix. The system's comparative advantage or efficiency was measured by social profitability. A positive social profit, i.e., Rs.531162, demonstrate that the country efficiently uses scarce resources and has

a static comparative advantage in trading cashew.

Transfers are shown in the third row of the PAM. The difference between the private and social value of revenues, costs (both tradable and domestic factors) and profits could be explained by the policy interventions. The output transfer (I) can be either positive or negative. Private price of output less than that its social prices indicated a negative transfer provided by the policy which would cause the trade system to realize lesser private profits. A divergence in tradable input prices (J) negative show causing an implicit subsidy or transfer of resources in favour of the domestic system and domestic factor prices (K) positive causing an implicit tax or transfer of resources away from the domestic system.

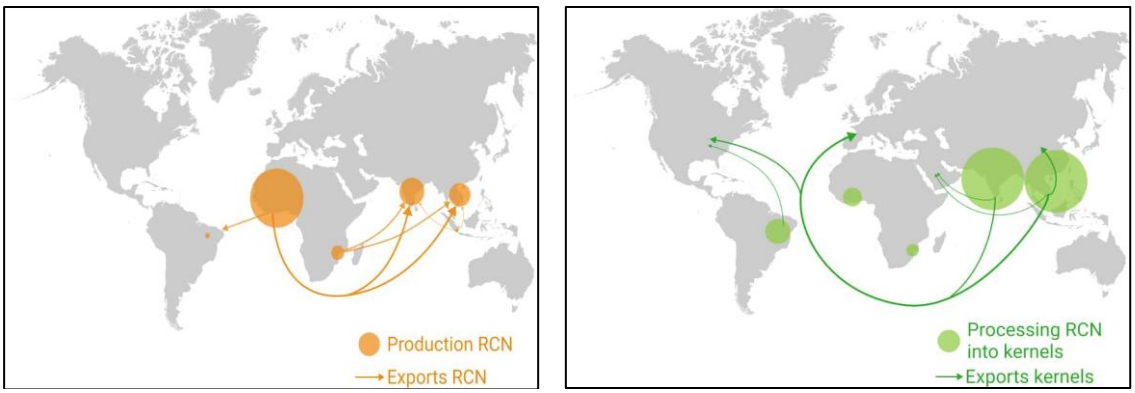

Fig 1. Raw Cashewnut production and processing

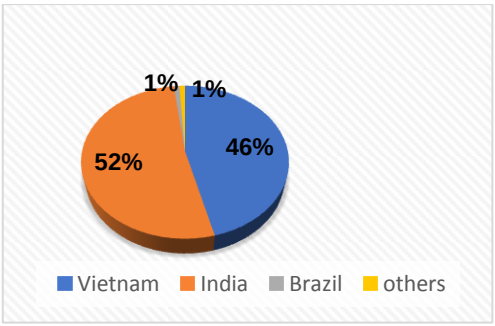

Fig. 2. Raw Cashew Import (2014-2019)

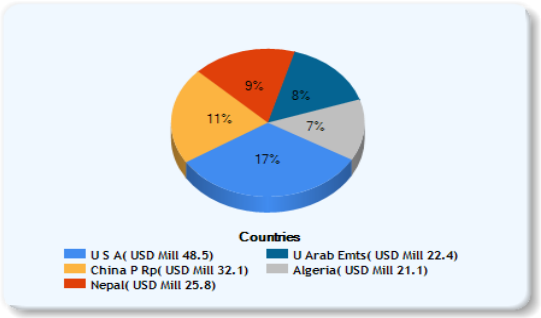

Fig. 3. Countries Importing Cashew (2014-2019)

Table 4. Policy Analysis Matrix (PAM) of cashew nut trade (in Rs)

Indicators	Revenues	Input cost		Profit
		Tradable goods	Non-tradable goods	
Private prices	685000	126590	242990	315420
Social prices	834000	139144	163694	531162
Net transfers	-149000	-12554	79296	215742

Table 5. Financial and economic efficiency indicators of the Policy Analysis Matrix (PAM)

1- Private profit (Rs)	315420
2- Private Cost Ratio	0.44
3- Social profit (Rs)	531162
4- Transfer	-215742
5- Profitability Coefficient	0.59
6- Nominal Protection Coefficient	0.82
7-Effective Protection Coefficient	0.79
8- Domestic Resource Cost Ratio	0.24

Private cost ratio is the ratio of non-tradable factors to the tradable value added at private prices. This ratio measure served as the indicator of competitiveness of system. The trade of cashew is competitive because the PCR is less than one (0.44). The PC measured the impact of all policy transfers on profitability level. Profitability Coefficient less than one indicated the non-profitable effect of policy transfer.

NPC is a simple indicator of the incentives or disincentives and is the ratio of domestic price to a comparable world (social) price. NPC<1 (0.82) indicated that domestic farm gate price is less than the international price for output. This confirms the presence of taxes or any other policy that is detrimental to the realization of maximum output.

EPC is defined as the ratio of value added at private prices (A–B) to value added at social prices (E–F). EPC<1 (0.79) indicated a net tax to value added [1]. In addition, while the values less than one indicate that producers are not protected through policy interventions.

The DRC indicated whether the use of domestic resources is socially profitable (DRC< 1) or not (DRC >1). The DRC<1 (0.24) indicates that a country has a comparative advantage in the production of a specific commodity due to low domestic resource costs.

4. CONCLUSION AND POLICY SUGGESTIONS

Cashew is a valuable commodity in international trade and is a key source of foreign exchange for many countries, including India. India is the world's largest cashew processor, and exporter. India, being the world's cashew economy's leader in raw nut processing, it is the world's largest supplier of cashew kernels. Because India is a big exporter of cashew kernels, it's crucial to look into the competitiveness and trade performance. Private profitability and competitiveness are likely to be top priority for those concerned with incomes in particular. Economic planners who are concerned with the allocation of resources among sectors and the rise of aggregate revenue in the economy frequently emphasise social profitability and efficiency. Both sets of concerns eventually come down to policy incentives, which are a big part of the distinction between private and social profitability, and how those incentives can be changed.

Despite the distortions, the cashew nut industry, according to this study, was financially and commercially profitable (revenue exceeds cost, i.e., domestic and social profit is positive-685000>369580 was a domestic profit, 834000>302838 was a private profit). A negative divergence in tradable input prices (J) indicated an implicit subsidy or resource transfer in favour of the domestic system, whereas a positive divergence in domestic factor prices (K) indicated an implicit tax or resource transfer away from the domestic system. An NPC<1(0.82) indicated that the domestic market price of the commodity was lower than the border price, encouraging the export of the commodity, indicated that cashew growers earned lower prices than export parity/economic pricing, shows cashew prices in India were not protected. EPC<1 (0.79), there are negative incentives (a tax on producers), and the producer must be offered incentives. DRC<1 (0.24) indicated that a country has a comparative advantage in terms of production. If the denominator (value added assessed at world prices) is less than one, the numerator (the cost of the domestic resources measured at their shadow prices) has overtaken the denominator. We earn/save one rupee of foreign exchange by using our domestic resources of Rs.0.24 in cashew trading, according to the average DRC coefficient of 0.24.

As a result, boosting cashew exports is a financially viable option. It means that cashew has a competitive advantage since it may generate foreign exchange at a lower resource cost. This study suggests that Indian cashew sector is highly profitable when it re-exports the processed cashew kernel to other countries because NPC<1 indicated the world price is more than the domestic price and DRC <1 also implies that value added by tradable inputs at social prices is high.On other hand to meet out the domestic demand in future, the farmers should be encouraged by providing subsidy for domestic production because it has been estimated that the requirement of raw cashewnuts will be 25 million tonnes by 2030 and would touch the mark of 45 million tonnes of raw cashewnuts by 2050 (Vision 2050, Directorate of Cashew Research, ICAR) and domestic factor cost is high mainly due to labour intensive processing. So it is recommended to improve the technology in cashew processing.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Monke E, Pearson SR. The Policy Analysis Matrix for Agricultural Development. Ithaca, N.Y., USA. Cornell University Press. 1989;15-19.
2. Mohanty, Fang, Chaudhary Competitiveness of Indian Cotton Production: A Policy Analysis Matrix Approach. Center for Agricultural and Rural Development Iowa State University Ames, Iowa. 2002;50011-1070. Available:www.card.iastate.edu.
3. Wadkar SS, Talathi JM, Torane SR. Performance of cashew exports from India. Indian. J. Agric. Mktg. 2005;48(1):24-27.
4. Adesina, Ousmane N. Coulibaly. Policy and competitiveness of agroforestry-based technologies for maize production in Cameroon: An application of policy analysis matrix. International Institute of Tropical Agriculture. Humid Forest Station., Yaounde, Cameroo; 2008.
5. Reig-Martínez, Picazo-Tadeo1 A and Estruch V. The policy analysis matrix with profit-efficient data: Evaluating profitability in rice cultivation. Spanish Journal of Agricultural Research. 2008;6(3):309-319. Available online at www.inia.es/sjar ISSN: 1695-971-X.
6. Kouakou Paul-Alfred. The approach of the Policy Analysis Matrix to the study of the cashew nut sector in Cote d'Ivoire. International Journal of Business Management and Economic Research (IJBMER). 2019;10(1):1534-1542.
7. Saptana, Sayekti AL, Perwita AD, Sayaka B, Gunawan E, Sukmaya SG, et al. Analysis of competitive and comparative advantages of potato production in Indonesia. PLoS ONE. 2022;17(2): e0263633. Available:https://doi.org/10.1371/journal.
8. Padmanaban K, Mishra P, Sahu PK and Havaldar Y. Export of cashew kernel from India: its direction and prediction. Economic Affairs. 2015;59(4):521-527.
9. Oluyole KA, Agbeniyi SO, Ayegbonyin KO. Competitiveness of Cashew Production in Nigeria" International Journal of Research in Agriculture and Forestry. 2017;4(8), 2017, PP 1-7:2394-5907 (Print) & ISSN 2394-5915.
10. Bhoomika HR and Sudha Rani N. Problems and prospects of cashew cultivation in India- an overview. International Journal of Current Microbiology and Applied Sciences. 2018;7(10): 3687-3694
11. Quddus Muhammad A. Comparative Advantage of Major Crops Production in Punjab: An Application of Policy Analysis Matrix. The Lahore Journal of Economics. 2011;16(1):63-94.
12. Kanana S, Chinnadurai M. Study of Export Competitiveness of Groundnut in India. Global journal of advanced research. 2015;2(2):512-520.
13. Guledgudda SS, Patil BL and Rajur BC (2015). Export performance of Indian cashewnut: an analysis. Economic Affairs 59(4): 669-674.

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