P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 11; November 2024; Page No. 432-439

Received: 19-09-2024
Accepted: 23-10-2024

Indexed Journal
Peer Reviewed Journal

Indian dried milk commodities competitiveness analysis

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DOI: https://doi.org/10.33545/26180723.2024.v7.i11f.1352

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Abstract

This study examines India's trade competitiveness in concentrated and sweetened milk and cream (HS 0402), along with global and national trade factors such as patterns, growth, instability, and competitiveness. Secondary data on export values (in USD) for Indian milk powder products, categorized by the 6-digit Harmonized System (HS), was collected from 2001 to 2022. The analysis employed the Linear Growth Model, Instability Index, and Nominal Protection Coefficient (NPC). Key findings highlight growth, market share, instability, and competitiveness in the trade of concentrated and sweetened milk and cream, specifically for 'Skimmed Milk Powder (HS 040210)', 'Whole Milk Powder - Unsweetened (HS 040221)', and 'Whole Milk Powder - Sweetened (HS 040229)'.

Keywords: Dairy commodities, harmonized system (HS), trade competitiveness, skimmed milk powder (SMP), whole milk powder (WMP), compounded annual growth rate (CAGR), instability index, nominal protection coefficient

1. Introduction

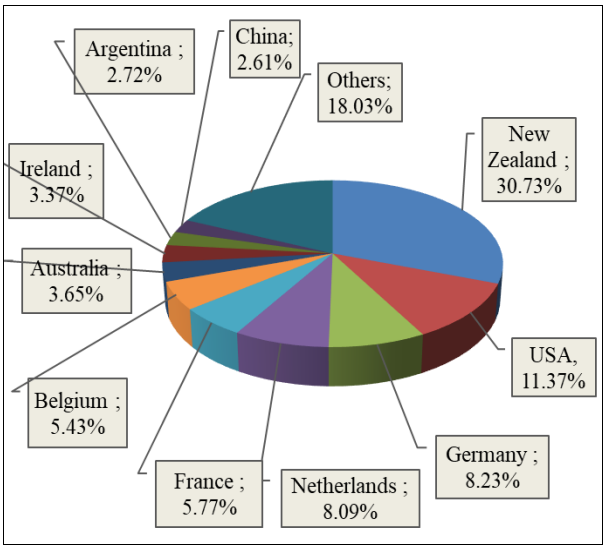
1.1 Milk Commodities Global Trade Scenario

Global dairy exports fell to 8.04 billion USD in 2020, a 0.76% decrease from the previous year, following a 1% increase in 2019. Exports represent a small portion of production in countries like India and Pakistan, keeping global milk trade below 10%. In 2019, China, Russia, the Philippines, and Indonesia saw significant import increases, offset by declines in Algeria, the UAE, Iraq, and Vietnam. Much of the rising global demand was met by New Zealand, the EU, Turkey, Egypt, and Belarus, while the U.S., Mexico, Australia, and Argentina experienced reduced shipments that fiscal year (FAO, 2020) [3].

In 2019, Asia remained the largest milk importing region, with a 1.8% increase in imports, followed by Europe (+11.6%), North America (+12.8%), Central America and the Caribbean (+3.5%), and Oceania (+1.0%). In contrast, Africa and South America saw declines in imports, at -5.3% and -26.9%, respectively. While Europe (+6.0%), Oceania (+6.0%), Africa (+8.4%), and Asia (+1.0%) contributed to global expansion, North America (-8.8%), Central America and the Caribbean (-51.0%), and South America (-51.0%) experienced significant drops, leading to an overall decline of -7.7% (FAO, 2020) [3].

1.2 Milk & Cream - Concentrated & Sweetened (HS 0402) Trade: Global Scenario

Figure 1 shows that, despite a global decline in concentrated milk and cream sales, the European Union and New Zealand increased their shipments, with a notable decrease only in Hong Kong, China. New Zealand was the largest exporter, holding a 31% share worth $58.6 million, followed by the U.S. (11%), Germany (8%), the Netherlands (8%), and France (6%).

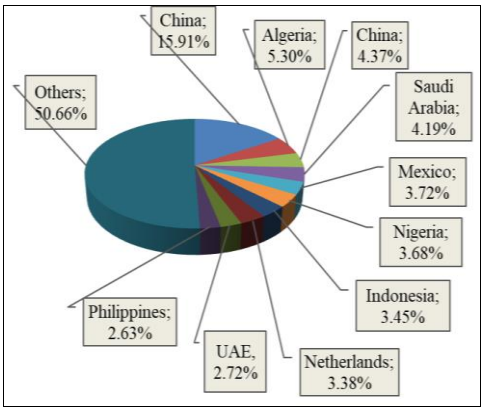


(ITC Trade Map, 2021)

Fig 1: Country-wise Share in global exports of 'Concentrated & Sweetened – Milk & Cream' (ITC HS Code - 0402) for FY 2020

1.3 Milk & Cream - Concentrated & Sweetened (HS0402) Import: Global Scenario

Figure 2 indicates that imports of concentrated milk and cream increased in China, Algeria, Saudi Arabia, Nigeria, and Indonesia. China was the largest importer, accounting for 16% of the total, followed by Algeria at 5%, and Hong Kong, Saudi Arabia, and Mexico each at 4%. In terms of value, China imported approximately 3,331,361 USD.



(ITC Trade Map, 2021)

Fig 2: Country-wise Share in global imports of 'Concentrated & Sweetened – Milk & Cream' (ITC HS Code - 0402) for FY 2020

1.4 Milk & Cream – Concentrated & Sweetened (HS 0402) Trade: Indian Scenario

In 2020, India's trade of 'Milk and cream - concentrated or containing added sugar' (HS Code 0402) amounted to 25,260 thousand USD, with 7,571 tons exported, representing 0.12% of global trade and 14.07% of India's dairy commodity trade. The largest contribution came from 'Milk and cream in solid forms with fat content ≤ 1% to < 6%' (HS Code 040210) at 13,316 thousand USD, followed by 'sweetened milk and cream with fat content > 1 to 5%' (HS Code 040229) at 9,944 thousand USD, and 'unsweetened milk and cream with fat content > 1 to 5%' (HS Code 040221) at 1,119 thousand USD.

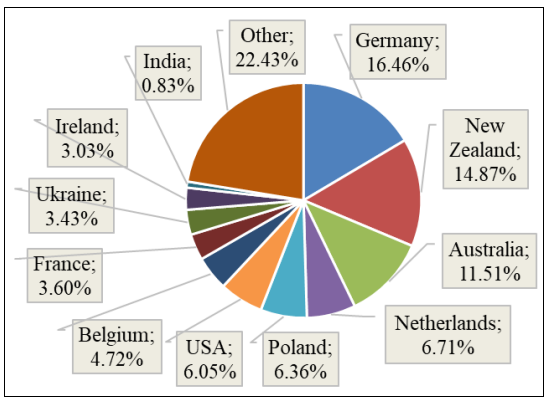
Table 1: Products exported under HS Code – 0402

Sr. No	ITC HS Code 4 Digit	ITC HS Code 6 Digit	Product Description	Value of Export FY 2020 ('000 USD)
1	0402 (100)	040210	Milk and cream in solid forms, of a fat content by weight of <= 1,5%	13316 (52.72)
2		040221	Milk and cream in solid forms, of a fat content by weight of > 1,5%, sweetened	1119 (4.43)
3		040229	Milk and cream in solid forms, of a fat content by weight of > 1,5%, sweetened	9944 (39.37)
4		040291	Milk and cream, concentrated but unsweetened (excluding in solid forms)	97 (0.38)
5		040299	Milk and cream, concentrated and sweetened (excluding in solid forms)	784 (3.10)

Values shown in the parenthesis are the percentage of the total value (ITC Trade Map, 2021)

1.4 Skimmed Milk Powder (HS 040210)

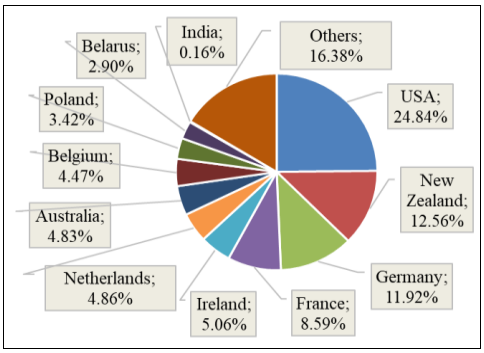
In 2001, Germany led skimmed milk powder (SMP) exports with 16.46% of the global share, followed by New Zealand (14.87%), Australia (11.51%), the Netherlands (6.71%), and Poland (6.36%). By 2020, the USA, with just a 6.05% share in 2001, became the top SMP exporter at 24.84%, ahead of New Zealand (12.56%), Germany (11.92%), France (8.59%), and Ireland (5.06%). India's SMP trade declined over two decades, dropping from 0.83% in 2001 to 0.16% in 2020. European countries collectively increased their share from 44.31% in 2001 to 46.05% in 2020.



(ITC Trade Map, 2021)

Fig 3: Share in Value of Global SMP Trade in the Year 2001

In 2020, global skimmed milk powder (SMP) trade reached 31.2 million tons, valued at 82.92 billion USD. The USA led exports with 818,738 tons worth 20.28 billion USD, followed by Germany (368,236 tons worth 9.73 billion USD) and New Zealand (362,374 tons worth 10.26 billion USD). France and Ireland were also among the top five exporters.



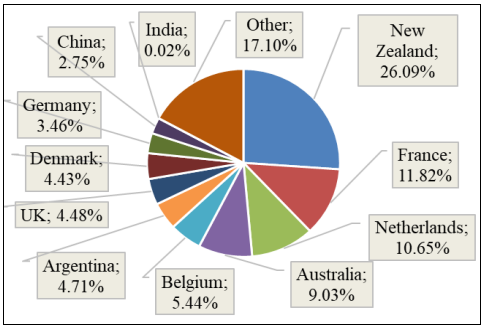
(ITC Trade Map, 2021)

Fig 4: Share in Value of Global SMP Trade in Year 2020

India's share in the value of 'Skimmed Milk Powder' trade was 0.83 per cent in the year 2001, which has declined over the past two decades, showing a 0.16 per cent share in the value of trade in the year 2020.

1.4.1 Whole Milk Powder - Unsweetened (040221)

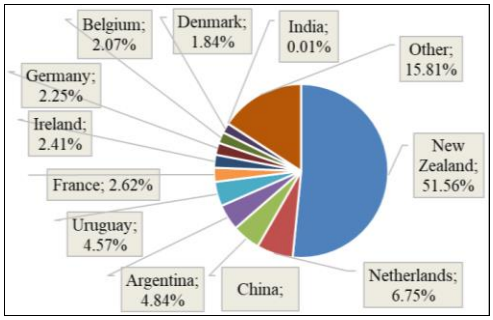
In 2001, New Zealand was the top exporter of unsweetened whole milk powder (WMP) with a 26.09% share, followed by France (11.82%), the Netherlands (10.65%), Australia (9.03%), and Belgium (5.44%). European countries held 35.80% of the total export value. By 2020, New Zealand increased its share to 51.56%, while Europe's share dropped to 22.51%. New Zealand exported 1.55 million tons of unsweetened WMP worth 47.51 billion USD in 2020. India's share, already small at 0.02% in 2001, declined further to 0.01% by 2020.



(ITC Trade Map, 2021)

Fig 5: Share in Value of Global 'WMP – Unsweetened' Trade in the Year 2001

In 2020, global trade of unsweetened whole milk powder (WMP) reached 26.61 million tons, valued at 91.86 billion USD. New Zealand, Argentina, the Netherlands, Uruguay, and Belgium led in quantity, while New Zealand, the Netherlands, Hong Kong-China, Argentina, and Uruguay topped export value. New Zealand remained the largest exporter, trading 1.55 million tons worth 47.51 billion USD. The Netherlands exported 141,133 tons valued at 6.22 billion USD, while Argentina traded 148,261 tons worth 4.46 billion USD. Although China exported only 25,578 tons, it earned 4.86 billion USD, reflecting a higher unit value.



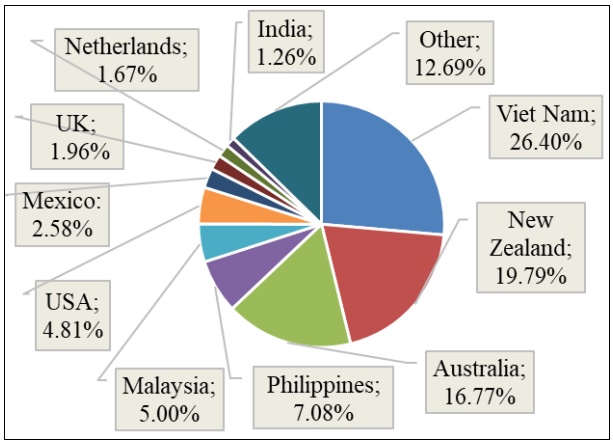
(ITC Trade Map, 2021)

Fig 6: Share in Value of Global 'WMP – Unsweetened' Trade in the Year 2020

India's share in the value of the 'WMP – Unsweetened' trade was negligible in the year 2001, which has remained stagnant over the past two decades, showing a 0.01 per cent share in the value of trade in the year 2020.

1.4.2 Whole Milk Powder - Sweetened (040229)

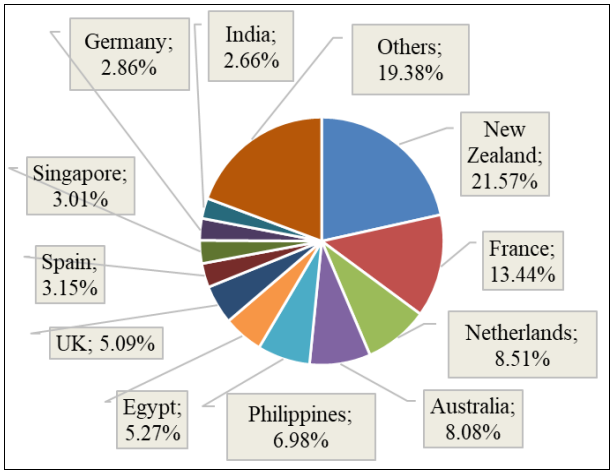
In 2001, Vietnam led sweetened whole milk powder (WMP) exports with a 26.40% share, followed by New Zealand (19.79%), Australia (16.77%), and the Philippines (7.08%). By 2020, New Zealand became the top exporter with 21.57%, while Australia's share dropped to 8.08%. European countries saw a significant rise, from 3.63% in 2001 to 33.05% in 2020. India's sweetened WMP market remained stagnant, with its global share increasing modestly from 1.37% in 2001 to 2.06% in 2020.



(ITC Trade Map, 2021)

Fig 7: Share in Value of Global 'WMP – Sweetened' Trade in the Year 2001

In 2020, global trade of sweetened whole milk powder (WMP) reached 98,046 tons, valued at 370.99 million USD. The top five exporters were the UK, New Zealand, France, the Philippines, and the Netherlands. The UK led with 20,512 tons worth 19.06 million USD, followed by New Zealand with 12,258 tons worth 80.75 million USD, and France with 11,452 tons valued at 50.31 million USD. Although the UK exported the most in quantity, New Zealand and France earned higher unit values per ton.



(ITC Trade Map, 2021)

Fig 8: Share in Value of Global 'WMP – Sweetened' Trade in the Year 2020

In 2001, India accounted for 1.26% of the global trade value in 'WMP – Sweetened' products, which grew to 2.66% by 2020. This paper analyzes the growth and instability in exports of 'Skimmed Milk Powder (SMP)', 'Unsweetened Whole Milk Powder', and 'Sweetened Whole Milk Powder', as well as their competitiveness in the global market.

2. Methodology

Secondary time series data from 2001 to 2020 were obtained from the International Trade Centre – Trade Map. This included information on export quantities, values, market shares of various countries, and domestic and international export prices for 'Skimmed Milk Powder (ITC HS Code – 040210)', 'Whole Milk Powder - Unsweetened (ITC HS Code – 040221)', and 'Whole Milk Powder - Sweetened (ITC HS Code – 040229)'. The analysis utilized compounded annual growth rates, instability indices, and nominal protection coefficient.

2.1 CAGR (Cumulative Annual Growth Rate)

The data so collected was analyzed on a time series analysis and the cumulative annual growth rates were calculated to

observe the growth trend of dairy commodities between 2001 and 2019. The form of the function used is:

$\gamma = \alpha\beta t$

This was then converted into a linear function with the logarithmic transformation, presented as:

Log γ = log α+ t log β
Where, γ = Dependent Variable

t = Independent variable (time in a year)
The compound annual growth rate was then calculated using the following formulae:

CAGR = (Antilog b -1) * 100
This equation was then estimated by applying the ordinary least square method.

2.2Instability Index
The simple coefficient of variation (CV) often contains the trend component and thus overestimates the level of instability in time series data characterized by long-term trends. To overcome this problem, the Cuddy Della Valle Index will be used to correct the CV by following the formula:

Instability Index (II) = CV x $\sqrt{(1-R^2)}$

Where,
CV = co-efficient of variation
R^2 = co-efficient of determination

2.3 Nominal Protection Coefficient (NPC)
While the competitiveness of any product/commodity can be measured in various ways, NPC happens to be one of the popular measures (Parida, *et al*., 2021) [11].
The rationale behind the computation of NPC is that it shows the divergence of domestic price from the international/border equivalent prices and thereby explains the level of protection to the commodity in a country. Such divergence was mainly due to the presence of market interventions such as taxes, subsidies, and other policy instruments. NPC is computed by using the following equation:

$$NPC = \frac{\text{India's Export Price}}{\text{World Export Price}}$$

Where NPC is the nominal protection coefficient of the its commodity; Pi d is the domestic price of it the commodity in domestic currency; Pi b is the border price in international currency and ER is the exchange rate. Although this may not completely explain a commodity's competitiveness level, the wholesale price prevailing in the domestic market cannot be considered as the export price. Therefore, in the present study, a comparison has been made between the unit price of exports (i.e., export value/export quantity) in India and the unit price in the world. Both the prices are given in US$ and are freight on board (fob) prices, referring that the cost of movement of goods is borne by the exporter prices. Thus,

$$NPC = \frac{\text{India's Export Price}}{\text{World Export Price}}$$

Unit export prices were derived as the following,

$$\text{Export Price (USD/ton)} = \frac{\text{Export Values}}{\text{Export Quantity}}$$

If the NPC ratio < 1 implies that the country has a competitive advantage over those commodities and further incentives for exports. Thus, the commodity is not protected. In other words, producers are taxed, and consumers are subsidized. If the NPC ratio > 1 means a lack of competitive advantage which is discouraged export. A such commodity is being protected by the government because under free trade price is assumed to be lower. In other words, producers are subsidized, and consumers are taxed (Khorajiya, *et al*., 2018, Parida, *et al*., 2021) [8, 11].

3. Results and Discussion
3.1 Growth & Instability Analysis
Table 2 indicates that India's trade in 'Skimmed Milk Powder (ITC HS Code – 040210)' has shown a non-significant growth trend over the last two decades, with a -1.44% change in traded volume and a 0.97% change in export value. The Instability Index for SMP trade volume is 105.38, indicating instability, while the value of exports is highly unstable at 130.73, suggesting minimal variation in unit prices.
Similarly, India's trade in 'Whole Milk Powder - Unsweetened (ITC HS Code – 040221)' has also shown a non-significant decline, with a -5.09% change in traded volume and a -1.36% change in export value. The Instability Index for both volume and value is high, at 149.27 and 157.59, respectively.
In contrast, India's trade in 'Whole Milk Powder - Sweetened (ITC HS Code – 040229)' has remained stagnant, with a -0.77% change in traded volume and a 3.78% increase in export value. The Instability Index for Sweetened WMP is more moderate, at 86.18 for volume and 75.56 for value, indicating greater stability compared to Skimmed Milk Powder and Unsweetened Whole Milk Powder.

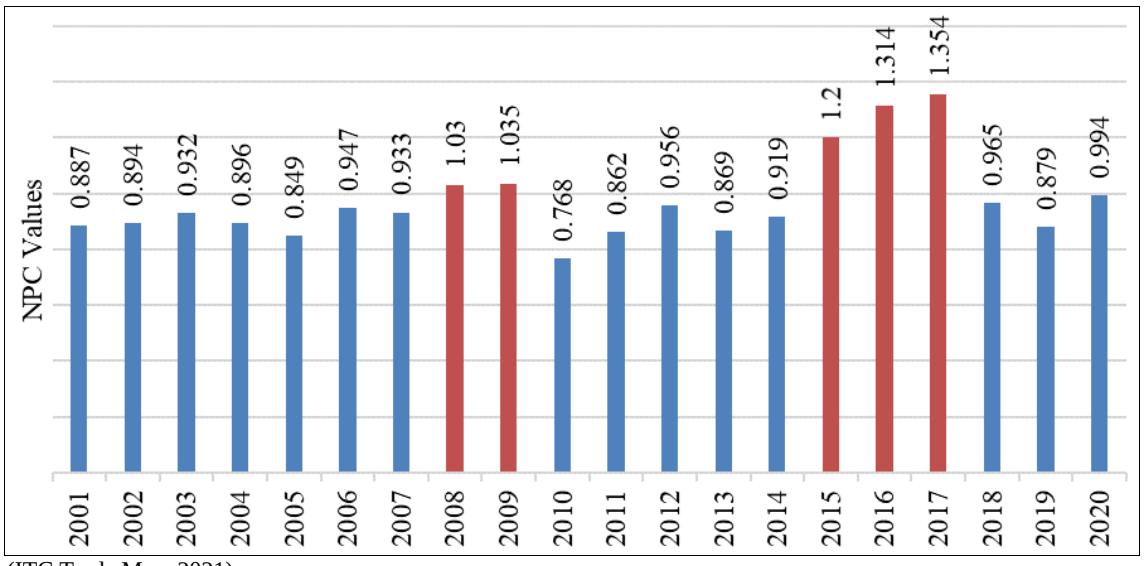
Table 2: Growth & Instability analysis for HS402 products

Year	SMP		WMP - Unsweetened		WMP – Sweetened	
	HS 040210		HS 040221		HS 040229	
	Quantity (tons)	Value (‘000 USD)	Quantity (tons)	Value (‘000 USD)	Quantity (tons)	Value (‘000 USD)
2001	15012	26060	451	684	3021	5297
2002	13153	17557	2	4	581	941
2003	9326	15519	9	14	656	1435
2004	16659	31202	46	113	2167	6505
2005	53349	99827	2004	4093	8744	19565
2006	32700	68005	1512	3614	7894	16262
2007	30784	99720	304	1072	680	1526
2008	43450	152048	1652	6648	6149	21720
2009	16191	37414	111	323	3340	12286
2010	22998	50828	35	91	2992	9383
2011	3005	9134	1	2	638	1981
2012	34437	100707	9	30	34	111
2013	145395	482542	1769	7529	4682	19254
2014	60539	217064	659	2986	3022	12124
2015	17158	48910	2	10	1098	4655
2016	18550	50850	0	2	1015	2172
2017	9490	28986	18	60	2119	7715
2018	42582	80806	42	138	2576	10868
2019	8442	17265	182	641	2499	11123
2020	5040	13316	290	1119	2023	9944
II	105.38	130.73	149.27	157.59	86.18	75.56
CAGR	-1.44 NS	0.97 NS	-5.09 NS	-1.36 NS	-0.77 NS	3.78 NS

(ITC Trade Map, 2021)
Note: NS = Non-Significant.

3.2 Competitiveness Analysis

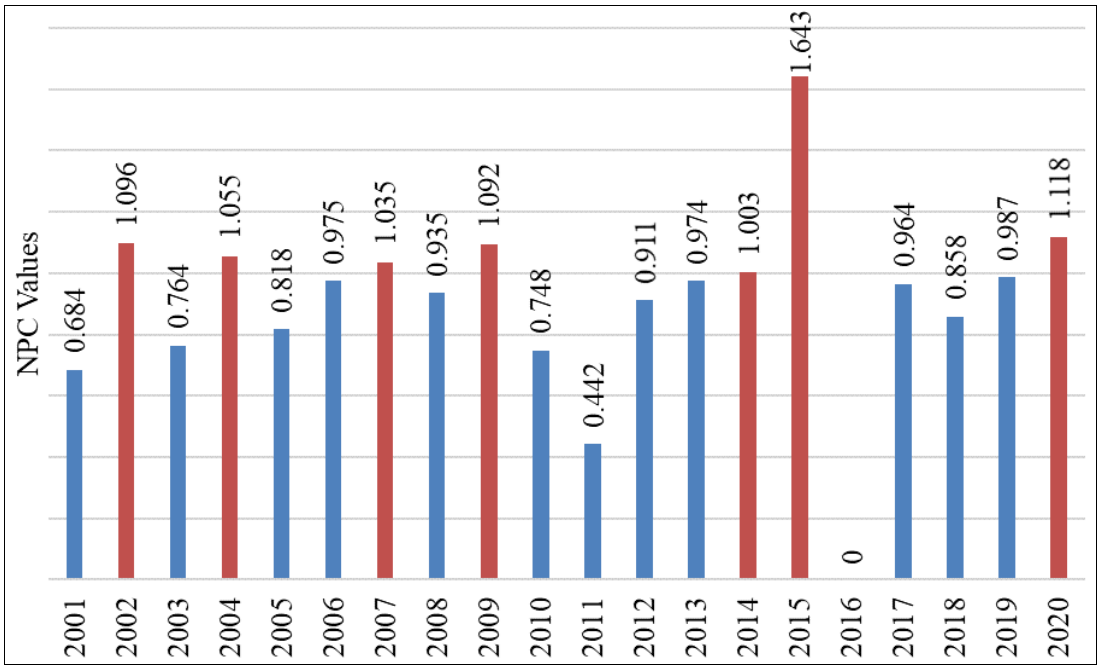
Figure 9 shows that the NPC value for Skimmed Milk Powder (ITC HS Code – 040210) ranges from 0.768 to 1.354 over the study period. This suggests that Indian butter trade has moderate export competitiveness, with NPC values below one for most of the two decades. From 2001 to 2010, Indian butter trade was competitive, except in 2008 and 2009. In the following decade (2011 to 2020), competitiveness continued, with the exception of 2015, 2016, and 2017.



(ITC Trade Map, 2021)

Fig 9: Skimmed Milk Powder NPC Value

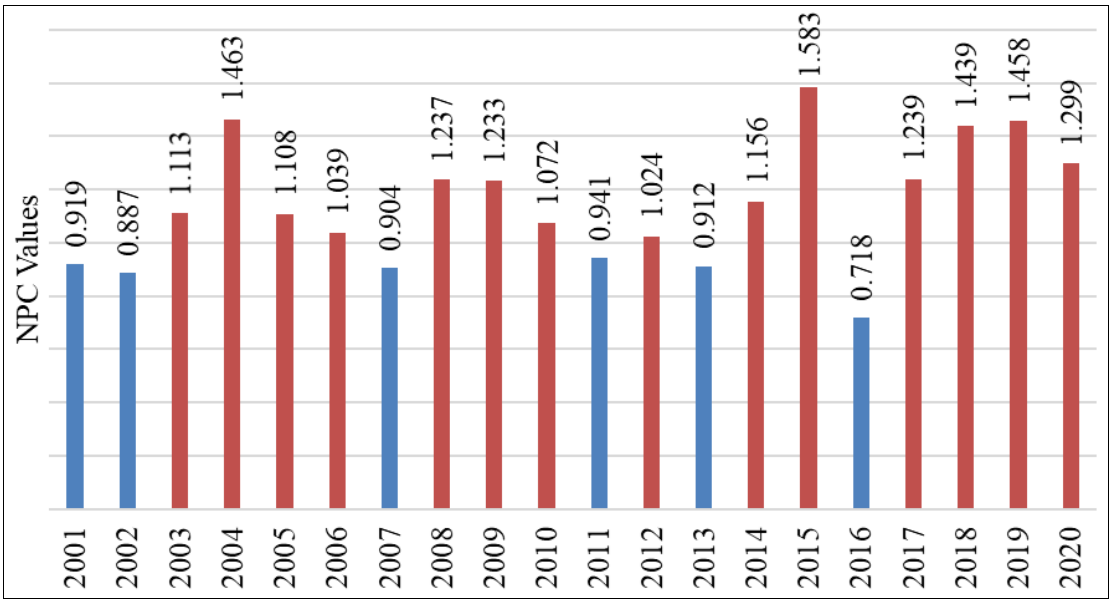
Figure 10 shows that the NPC value for 'Unsweetened WMP (ITC HS Code – 040221)' ranges from 0.44 to 1.643 over the study period, indicating moderate export competitiveness in Indian dairy spread trade, with NPC values below one for most of the two decades. Notably, there were no recorded exports in 2016. From 2001 to 2010, trade was competitive except in 2002, 2004, 2007, and 2009. In the following decade (2011 to 2020), competitiveness persisted, with exceptions in 2014, 2015, and 2020.



(ITC Trade Map, 2021)

Fig 10: Whole Milk Powder - Unsweetened NPC Values

Figure 11 shows that the NPC value for 'Whole Milk Powder - Sweetened (ITC HS Code – 040229)' ranges from 0.718 to 1.583 over the study period, indicating that Indian sweetened WMP trade was generally non-competitive, with NPC values above one for most of the two decades. From 2001 to 2010, trade was competitive except in 2001, 2002, and 2007. In the following decade (2011 to 2020), competitiveness continued, with exceptions in 2011, 2013, and 2016.



(ITC Trade Map, 2021)

Fig 11: Sweetened – WMP, NPC Values

4. Conclusion

From the above findings of the study, it can be concluded that the trade of 'Concentrated & Sweetened – Milk and Cream' dairy commodities from India has shown negative non-significant growth over the last two decades, in terms of the quantum of the product trade, and its share of Indian exports remains minimal. Over the last two decades, the unit price received per unit for 'Skimmed Milk Powder (ITC HS Code – 040210), 'WMP - Sweetened (ITC HS Code – 040229),' have increased, except for the 'WMP – Unsweetened (ITC HS Code – 040221), yet the growth seen over the period of two decades is non-significant. Trade for all the HS 0402 commodities remained highly unstable over the period of analysis, except for the 'WMP – Sweetened (ITC HS Code – 040229).' The Indian 'Milk & Cream - Concentrated & Sweetened ' dairy commodities (HS 0402) trade has been moderately competitive for the majority period of the previous two decades, with NPC values below

unity, excluding 'Sweetened - Whole Milk Powder (ITC HS Code – 040229)'.

5. Acknowledgement
The authors gratefully acknowledge technical and financial support from the Centre for Agricultural Market Intelligence, NAHEP-CAAST, Anand under National Agricultural Higher Education Project, Indian Council of Agricultural Research, Pusa, Krishi Anusandhan Bhawan-II, New Delhi-110012.

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