Original Research Article

Analysing growth and instability of Indian yogurt market : A Global comparative approach

ABSTRACT

Fermented products were the first processed food consumed by humans, mainly for their longer shelf life, safety, and organoleptic qualities. Yogurt is one of the best-fermented products having the highest bioavailable cobalamin. In India, yogurt is an emerging value-added product with a CAGR of 10.20 percent and stands second after China. This paper evaluates the Comparison of the CAGR of India and Global in terms of revenue per capita, Price, and Volume of sale of yogurt. India is doing good than the global in yogurt. The CAGR of Revenue per capita, price, and volume of yogurt in India are 9.1 percent, 6.6 percent, and 3.4 percent, respectively. The Indian yogurt market shows low instability than the global market. This persuades many foreign giants to capture the growing Indian market of yogurt.

Keywords: *Yogurt, CAGR, Instability, Cuddy-Della Valle Index*

1. Introduction

Fermented foods and beverages were among the first processed foods consumed by humans. Yogurt and cultured milk, wine and beer, sauerkraut and kimchi, and fermented sausage were historically regarded for their longer shelf life, safety, and organoleptic qualities. Yogurt contains protein, calcium, potassium, phosphorus, and vitamins B2 and B12. It also functions as a fortification vehicle. (Fisberg and Machado, 2015).

With a value of 23,740 million US dollars, the Indian yogurt market would be second place after China. In terms of revenue, China and India are followed by the United States of America, Japan, and Indonesia. China has the world's highest yearly growth rate, at 11.20 percent, followed by India at 10.20 percent. Asia has four of the top five revenue-generating countries, making it the world leader in yogurt revenue generation (Statista, 2022). The yogurt sector in India is predicted to produce 35,310 million US dollars by 2025, encouraging numerous foreign corporations to invest in India, notably in the yogurt market, to capture revenue share through various methods of international business entry. (Statista, 2022).

2. Review of Literature

Balaji et al. (2011) recognised the conditions for the Indian probiotic industry to experience tremendous growth shortly. India had a clear advantage in the probiotic business and was experiencing economic growth. India produced the most milk and had the most cattle on the earth. There were numerous barriers preventing domestic and international companies from entering the Indian probiotic market, but the opportunities for industrial expansion quickly and gracefully outweigh these advantages. With only a few companies, the Indian probiotic market was estimated to be worth $2 million and was projected to grow to $8–10 million in three–four years. The Indian probiotic market now includes brands like Nestle, Amul, Yakult, Danone, and Mother Dairy, as well as a number of smaller businesses that work in various fields.

Rani et.al., (2017) evaluated cotton development, instability, and yearly variations during the past three decades in Pakistan. From 1981 to 2015, data for the time series on cotton's area, production, and yield were gathered from several issues of Pakistan's agricultural statistics. The findings showed that private company involvement led to favourable growth rates in cotton area, production, and yield over time. When the statistics were analysed, it was discovered that Pakistan's cotton production and area were instable, primarily because of insect and pest attacks on the crop.

Sheth and Jain (2017) discovered that India's dairy sector grew at a 15 percent CAGR from 2016 to 2020. Commodity items (milk and milk powder), Traditional VADP, and Emerging VADP account for 65.6 percent, 32.6 percent, and 1.9 percent of the dairy sector, respectively. These three segments are growing at annual rates of 15 percent, 16 percent, and 25 percent, respectively. The rising VADP category accounts for most sales through an organized market.

Bhusanar et.al., (2022) evaluated the groundnut production, area, and productivity in Rajasthan. They gathered secondary data and calculated Compound annual growth rate with trend of the last thirty years of groundnut production. The analysis discovered that the compound growth rates of groundnut area, production, and productivity were all positive and significant (R = 0.652**, 0.940**, and 0.603**, respectively), with CAGRs of 3.2, 6.4, and 2.8 percent.

3. Materials and Methods

The study is conducted in India and its comparison with Global statistics on yogurt. The study is based on the annual sales statistics of yogurt in terms of Revenue per capita (US Billion $), price (in US$), and volume in a million Kg. The data on yogurt (HS-04032011) from 2014 – 2021 have been taken from Statista. Further data has been analysed to calculate the Compound annual growth rate, and graphical representation was used to visualize the comparison of the CAGR of India with the Global CAGR of different parameters. a linear regression approach has been used to obtain the relative strength of revenue per capita, price, and volume of yogurt. The value is further used to calculate the Cuddy-Della Valle Index (CDVI)

3.1 Objectives of the study

1) To study the growth rate in Revenue per capita, price, and volume of yogurt in India and the Global.

2) To study the instability of revenue per capita, price, and volume of yogurt of India and Global.

3.2 Statistical analysis

The data were collected and cleaned in excel and assessed the CAGR (Compound Annual Growth Rate) with the help of SPSS.

3.2.1 Compound growth rate model

The compound annual growth rate (CAGR) is a statistic that straightens annual gains in revenue, returns, users, and so on over a set number of years as if the growth had occurred gradually each year.

$$CAGR = \left(\frac{V\ inal}{V\ begin}\right)^{1/t} - 1$$

Where:

CAGR = Compound annual growth rate

V_{final} = Final Value

V_{begin} = beginning value

t = time in years

3.2.2 Cuddy-Della Valle Index (CDVI)

The Cuddy-Della Valle Index (CDVI), which considers the long-term trend, was used to quantify the instability of economic indicators. Cuddy and Della Valle (1978) introduced the Cuddy Della Valle Index, which is a modification of the coefficient of variation used to measure trends and pinpoint the exact direction of instability. CDVI was chosen over coefficient of variation (CV) because CV overestimates price series variation, and CDVI was adjusted for its coefficient of determination value (Cuddy & Valle, 2009).

$$I = CV * \sqrt{1 - Ad\ R^2}$$

Where;

I = CDVI

CV = Co-efficient of variation

Adjusted R^2 = Coefficient of determination

List 1 : The ranges of CDVI are given below

Value	**Instability Level**
0 – 15	Low
15 – 30	Medium
Greater than 30	High

Source: (Kaur et.al., 2021)

4. Result and Discussion

Table 1 shows that global sales have an increasing trend in terms of Revenue per capita, price, and volume. In 2014 the revenue per capita was 15.31 US billion $ which rose to 18.96 US billion $. The average price per unit of yogurt is 2.08 $ in 2014 and in 2021 the price of yogurt came to 2.54 $. The volume also has an increasing trend with value rose from 51.69 million kg in 2014 to 56.29 million kg in 2021.

Table 1: Global sale statistics of yogurt

Year	Revenue per capita (US Billion $)	Price ($)	Volume (Million Kg)
2014	15.31	2.08	51.69
2015	14.41	1.98	51.48
2016	14.68	2.04	51.61
2017	15.64	2.17	52.23
2018	16.38	2.26	52.97
2019	16.81	2.34	53.18
2020	17.6	2.4	54.65
2021	18.96	2.54	56.29

Source: Statista, 2022

Yogurt sales in India are rising in revenue, price per unit, and volume. Table 2 clearly shows that revenue in 2014 was 12.13 billion US dollars, whereas revenue in 2021 was 23.74 billion US dollars. India's price per unit rose from 1.04 US dollars in 2014 to 1.59 US dollars in 2015. Yogurt

sales volume increased slightly from 11.69 million kilograms in 2014 to 14.97 million kilograms in 2021.

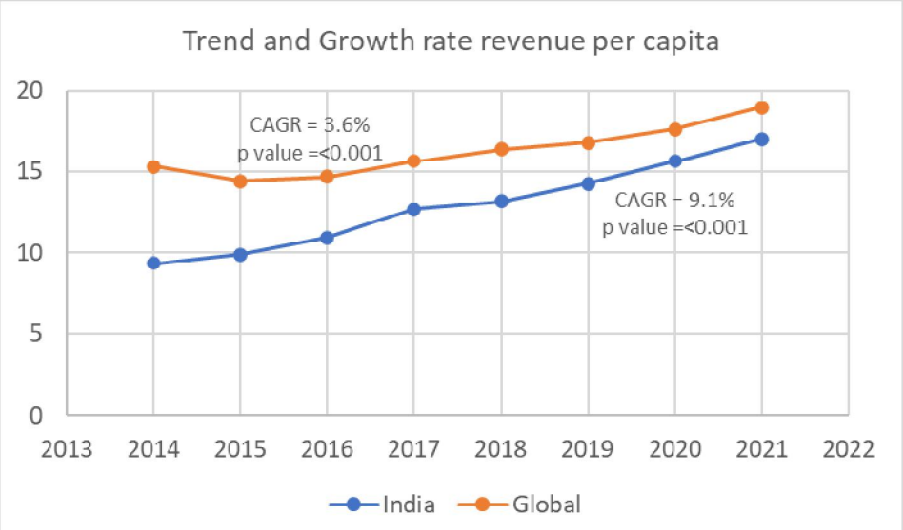
Table 2: Sale statistics of yogurt in India

Year	Revenue per capita (US Billion $)	Price ($)	Volume (Million Kg)
2014	9.36	1.04	11.69
2015	9.91	1.08	12.06
2016	10.96	1.16	12.52
2017	12.73	1.32	12.94
2018	13.19	1.32	13.54
2019	14.28	1.43	13.68
2020	15.64	1.53	14.15
2021	17.03	1.59	14.97

Source: Statista, 2022

Figure 1 shows the comparison of India and Global's revenue per capita of yogurt. It is easily visible that the global whole has more revenue per capita than India. However, India has a higher annual growth rate than the global. India's growth rate of revenue per capita has a value of 9.1 percent, much higher than the global growth rate of only 3.6 percent.

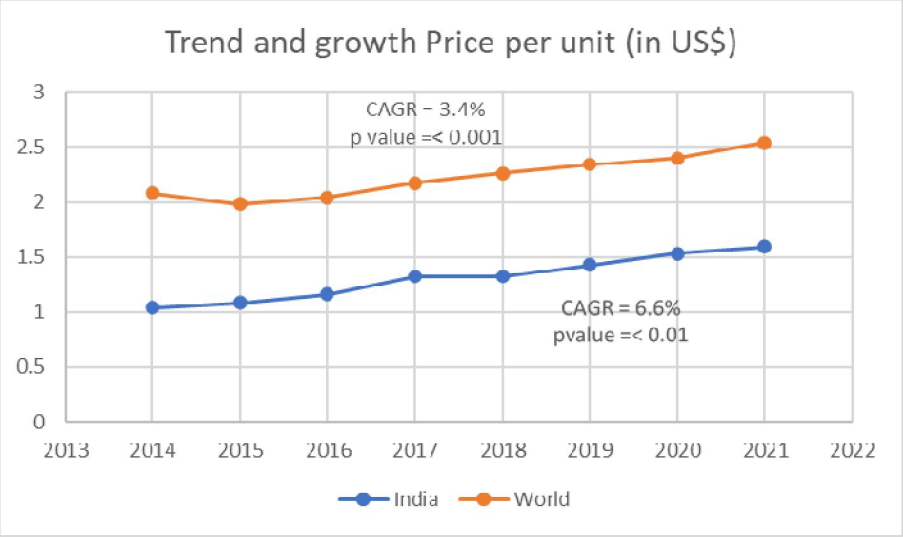
Figure 1: Trend and annual growth rate in revenue per capita of yogurt



Source: Researcher's computation from Secondary data

The global per unit price of yogurt and the Price per unit in India both have an increasing trend. The compound annual growth rate of India has two-fold value than the price at global level. The CAGR of India has value of 6.6 percent whereas the CAGR at global is 3.4 percent.

Figure 2: Growth rate of price (in US $) of yogurt

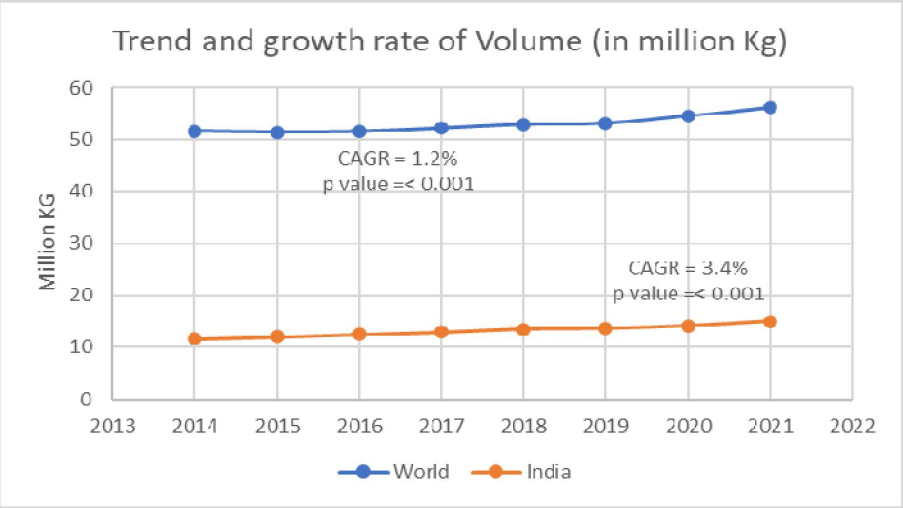


Source: Researcher's computation from Secondary data

Figure 3 represents the compound annual growth rate of volume of yogurt produced. It is pretty understandable that the global level the value must be relatively higher than that of India. But

the volume produced in India has a growth rate of 3.4 percent, which is higher than that of the global growth rate of only 1.2 percent.

Figure 3: Trend and annual growth rate of volume of yogurt



Source: Researcher's computation from Secondary data

Table 3 represents the instability index of three different parameters of yogurt. The revenue per capita in India has CDVI of 2.313 percent compared to the world, which has a value of 3.993 percent. The price and volume has CDVI value of 2.143 percent and 1.022 percent for India, and 2.937 percent and 1.353 percent globally respectively. It is visible that India has more excellent stability than Globally in all three parameters.

Table 3: Instability of different parameters of yogurt India vis-à-vis World

	World			India		
	Revenue Per capita	Price	Volume	Revenue Per capita	Price	Volume
Mean	16.224	2.226	53.013	12.888	1.309	13.194
SD	1.540	0.194	1.696	2.721	0.203	1.101
CV	9.491	8.700	3.199	21.111	15.544	8.348
AdjR2	0.823	0.886	0.821	0.988	0.981	0.985
CDVI	3.993	2.937	1.353	2.313	2.143	1.022
Inference	Low Instability	Low Instability	Low Instability	Low Instability	Low Instability	Low Instability

Source: Researcher's computation from Secondary data

5. Conclusion

Yogurt has a potential dairy product having multiple health benefits. The form of cobalamin found the yogurt is highly bioavailable. The Indian yogurt market is in growth surprisingly comes second after China in terms of revenue with the growth rate of 10.20 percent. The CAGR of Revenue per capita, price, and volume has value of 9.1 percent, 6.6 percent, and 3.4 percent respectively**.** The growth rate is much higher than the global growth rate of all three parameters. The instability analysis finds that the Indian and Global markets have very low instability, but India has lesser value of instability than the global ones. This makes Indian market more stable than the rest of the global market. This persuades many foreign giants and organisation to expand their business to capture the growing yogurt market.

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