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RESEARCH ARTICLE

Geographical indications: Global trends and Indias' progress in agricultural and handicraft products

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Abstract

Geographical Indications (GIs) provide legal protection to products tied to specific regions, highlighting their unique qualities and heritage. The significance of GIs has grown globally, as they serve as tools to protect traditional products, promote regional economic development and ensure product quality in the market. This paper examines the role of GIs globally and in India, emphasizing their importance in promoting sustainable production practices and protecting intellectual property rights. The study utilizes secondary data from the World Intellectual Property Organization (WIPO) and the Intellectual Property India database, examining trends in GI registration across various product categories and states. China ranks first in the total GI share with 9785 GIs and India ranks 52nd with 530 GIs Globally in 2023. In India, Uttar Pradesh ranks first with 74 GIs and Tamil Nadu Ranks second with 59 GIs in 2024. The findings revealed that agricultural commodities and handicrafts products dominate the GI landscape in India, while globally, wines and spirits form the largest share of GIs. Compound Annual Growth Rate (CAGR) for Global (8.17 %) and Indian GIs (5.76 %) showed a positive growth rate for the period under study. CAGR analysis indicated the highest growth in the registration of GIs under agricultural commodities in India (10.63 %) and globally (12.14 %). The paper concludes that while India has made significant progress, further research and policy frameworks are needed to address challenges in promoting GIs and the support needed post-GI registration. Globally, GIs offer potential for economic growth, cultural preservation and sustainability.

Keywords

compound growth; geographical indications; global; India

Introduction

Intellectual Property (IP) refers to the protection of creations resulting from human intellect to safeguard the interests of their creators. It is a highly globalized law area encompassing industrial property, copyright and other intangible asset rights (1). Additionally, IP establishes who has the right to use and control these assets and how and from whom permission can be obtained (2). While both Trademarks and Geographical Indications (GIs) serve as identifiers and differentiation tools, Trademarks signify the busi-

ness origin of a product, whereas GIs indicate its geographical origin. GIs are legal protection for products specific to a geographical region and have unique qualities or characteristics associated with that region (3). The relationship between a product and its origin is referred to as GI. GIs can take various forms, such as Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI), depending on the product category and the country (4).

Additionally, the origin of a product has emerged as a key factor in ensuring its quality and differentiating it in the market (5). Various types of product certification have been introduced to inform consumers about products' distinct characteristics and safeguard producers from free riding and fraudulent activities (6). These certifications apply to various products, including food and beverages, natural products, and manufactured goods. GIs have gained more interest since their protection has been ensured multilaterally under the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement of the World Trade Organization (WTO). GIs are crucial for providing information about experiencing quality goods and serve as an effective market signalling tool to assure product quality, thereby reducing information asymmetry between buyers and sellers (7). GIs can also attain the two Sustainable Development Goals (SDG) among 17 by promoting sustained, inclusive and sustainable economic growth, full and productive employment, decent work for all and sustainable consumption and production patterns. GIs help small and medium-sized enterprises enhance their product reputation, build consumer trust, communicate their commitment to social responsibility, support regional economic development and prevent the fraudulent use of intellectual property rights. According to the fourth schedule of intellectual property in India, the goods are classified into 34 classes, in which class 31 describes the Agricultural, horticultural and forestry products and grains not included in other classes; live animals; fresh fruits and vegetables; seeds, natural plants and flowers; foodstuffs for animals, malt (8).

The European Union (EU) has been a frontrunner in the GI system, with products like Parmigiano Reggiano and Champagne benefiting from robust protection frameworks. Historically, France, Italy and Spain have been dominant in GI production. However, economies like China and India have recently made significant progress in recognizing and utilizing GIs to drive economic development (9). Even in the EU, financial data is lacking to support policies related to GIs (10). Although there is a positive effect on international trade for Bordeaux win PDO and Parmigiano Reggiano PDO, the GI scheme may be relevant to increasing the global reputation and competition of less-known agri-food products (11). Countries such as Vietnam, South Korea and Indonesia have increasingly adopted GIs to distinguish their products in global markets (12). GIs have positively contributed to sustainable rural development in Vietnam (13). In Indonesia, optimizing collaboration between farmers and relevant associations may increase the adoption of GI-based quality standards among Robusta coffee farmers (14). Also, farmers' knowledge mainly affected perceived behavioural controls and adopt GI practices and procedures in Indonesia. (15). GIs covering large geographic areas are found to be less effective (16).

GIs have become vital tools for cultural preservation and economic growth. India's GI journey began with the passage of the Geographical Indications of Goods (Registration and Protection) Act, 1999. It existed in 2004 and the first GI tag was awarded to Darjeeling Tea (17). Since then, India has experienced rapid growth in GI registrations. The rise of GIs in India is primarily driven by the need to protect traditional goods and boost rural economies. GI recognition has promoted sustainable production practices, as local communities focus on maintaining conventional methods that are often environmentally friendly (18). Research has shown that GI status can significantly increase the market share of products, both within India and globally (19). Despite these positive developments, the GI system in India faces several challenges. Awareness of GIs among both producers and consumers remains low, particularly in rural areas.

Additionally, registering and enforcing GIs can be complicated and costly, creating obstacles for smaller producers (20). The Challenges regarding GIs were the existence of inefficient institutions, organizational problems, power asymmetry and appropriation of value by the most potent agents of the supply chain (21). A key trend in GI is the growing recognition of GIs role in promoting local economies and sustainability. Additionally, adopting digital technologies to enhance the traceability and verification of GI products could open up new opportunities for market expansion (22). Marketing of GIs using metabolomics methods is considered a potential tool for marketing purposes and legal protection (23). Integrating instrumental and sensory attributes helps to identify robust, relevant and comprehensive geographical quality indications (24). This study highlights the current status of GI in the global and Indian context, which will help researchers and policymakers know more about the limitations and constraints in promoting GI and provide suitable policy frameworks in the future.

Materials and Methods

WIPO is the world's number one source of information and resources on global intellectual property and is one of the 15 specialized agencies of the United Nations. IP India is the source of GIs in India. The secondary data regarding the GIs granted at the global level was collected from the WIPO statistics database for 2017–23 and for India, the data was collected from the Intellectual Property India database for the period 2004–24. From the WIPO database, information on the number of GIs for the year/ category/ country was collected and segregated for analysis. From the IP India database, the collected data on the list of GIs granted from 2004–05. The data was filtered according to year/product category/state-wise. In WIPO, the data on country-wise GIs was available from 2017 only, so the IP India database was used to collect the data for India from

2004–24.

Percentage analysis was used to estimate the state-wise and countrywide contributions at the Indian and global levels.

Compound annual growth rate (CAGR)

Compound Annual Growth Rate was worked out for category-wise GIs for India and Global level for 2004–24 and 2017–23, respectively, by fitting an exponential function. The following mathematical form was used in Equation 1-4.

$$Y = ab^t \quad \text{……..(Eqn. 1)}$$

Where Y = Commodity-wise Number of GIs for India/ World, a = Constant, t = time in year and b = 1 + r/100 (r=% rate of compound growth rate

By taking logarithms on both sides, it has been reduced to following linear form,

$$\log Y = \log a + t\,(\log b) \quad \text{……..(Eqn. 2)}$$

For convenience, if we put 'log A = A' and 'log b = B', it can be written as

$$\text{Log } Y = A + B\,t \quad \text{……..(Eqn. 3)}$$

By solving Equation 3, the values of 'A' and 'B' have been computed. The following procedure has been adopted to calculate CAGR from the computed regression coefficients (25).

When 'B' has a positive value, the antilog of 'B' has been obtained and then one is subtracted from the antilog value of 'B'. Then, the Antilog of B-1 has been multiplied by a hundred. Thus, it gave the CAGR of increasing type. When 'B' has a negative value, the procedure of calculating CAGR is the same, but the growth rate value will be negative. This negative CAGR indicates the decreasing growth rate over time.

The percentage rate of compound growth per annum has been calculated as

$$r = (b\text{-}1) \times 100$$

$$r = (\text{Antilog 'B'} - 1) \times 100 \quad \text{…..(Eqn. 4)}$$

This represented a uniform rate of change from observation to observation.

Results and Discussion

Geographical indications at the global level

The country-wise analysis revealed the total overall GIs for the year globally. 2017–23 is 8,86,708 (Table 1). In 2023, the total GIs registered is 13.13 % less than those registered in 2017. Likewise, each category, such as Handicrafts, wines spirits, services and others, show negative change with 58.11, 2.29, 72.55 and 93.68 %, respectively, from 2017 to 2023. However, agricultural commodities showed a positive change, with 23.9 % higher GIs from 2017 to 2023. Wines and spirits represent the most significant portion of GIs, contributing 59.64 % (528832) of the total, followed by Agricultural commodities 3,37,008 (38.01 %) and Handicrafts 11,538 (1.30 %). Others and services account for a tiny proportion of 1.04 and 0.01 %, respectively (Fig. 1). liquors and agricultural commodities dominate the GI landscape. In contrast, services and others have a minimal shade. The Trend from 2017 to 2023 shows a positive and upward trend for the total GIs registered Globally (Fig. 2). In 2018, the number of GIs registered reduced to less than 50000 and after 2018, the number of GIs started increasing.

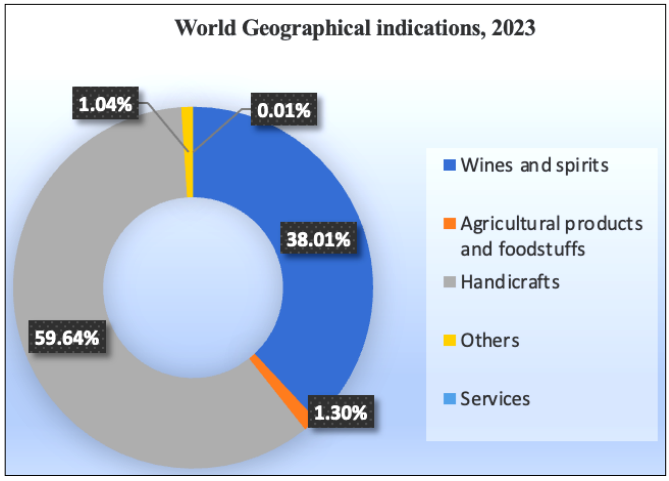

Fig. 1. World Geographical Indications by Product Category (2023).

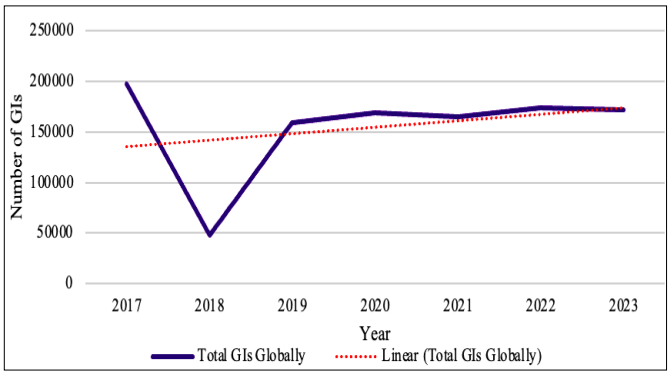

Fig. 2. Trend of Geographical Indications Registered globally (2017–2023).

Global level compound growth rate of geographical indications

The Compound annual growth rate (CAGR) for various cat-

Table 1. Global scenario on Geographical Indications Registered Global (2017–23)

Categories	2017	2018	2019	2020	2021	2022	2023	Total	% change over 2017
Agricultural Commodities	55675	19684	56541	61611	62870	67318	68984	337008 (38.01)	23.90
Handicrafts	5395	1063	2173	2044	1882	2116	2260	11538 (1.3)	-58.11
Wines and spirits	112783	24971	98543	103091	99592	103712	98923	528832 (59.64)	-12.29
Services	51	17	29	31	25	10	14	126 (0.01)	-72.55
Others	23729	2063	1920	2038	695	989	1499	9204 (1.04)	-93.68
Total	197633	47798	159206	168815	165064	174145	171680	886708 (100.00)	-13.13

Table 2. CAGR for Global level for the period of 2017–2023

Sr. No.	GI Products	CAGR (%)
1.	Agricultural Commodities	12.14
2.	Handicrafts	-4.80
3.	Wines and Spirits	9.20
4.	Services	-16.62
5.	Others	-31.94
6.	World Total GIs	8.17

egories of GIs at the global level is depicted in Table 2, in which the CAGR for total GI is 8.17 %, in which Agricultural commodities, wines and spirits show a positive growth rate of 12.14 and 9.20 % respectively. In contrast, handicrafts, services and others show a negative growth rate of -4.80, -16.62 and -31.94 %, respectively. This indicates that while agricultural commodities, wines and spirits are growing, categories like services, others and handicrafts are experiencing a decline in their CAGR. According to the national and regional authorities, China leads with 9785 GIs (Table 3), accounting for 4.45 % of the total registered GIs globally, followed by Germany with 7,586 GIs (3.45 %). Other European countries such as Hungary (7,290 GIs), Czech Republic (6657 GIs) and Slovakia (6421 GIs) are also prominent in GI registration. Italy (6330 GIs) and France (6098 GIs) have significant GIs, contributing to the top 10 in the list. The European Union contributes 5376 GIs (2.44 %). Outside Europe, countries like Vietnam (2133 GIs) and Australia (2071 GIs) also have a notable number of GIs. India ranks 52nd with 530 GIs (0.24 %) and the USA has 763 GIs (0.35 %). Other countries collectively contribute 2627 GIs, making up 1.19 % of the total. Total GIs across all national and regional authorities amount to 220029, with China, Germany and Hungary being the top contributors. GI certification enhanced the farm net income for the olives and wine sector in the European Union and positively affected household welfare and poverty reduction in rural Thailand (26, 27). Also, Cao Phong Orange GI positively contributed to sustainable rural development in Vietnam (13).

Table 3. Country-wise Geographical Indications in force in 2023

Sr. No.	National/Regional authority	Total	% to World Total	Cumulative Percentage	Sl. No.	National/Regional authority	Total	% to World Total	Cumulative Percentage
1	China	9,785	4.45	4.45	28	Spain	5,376	2.44	75.05
2	Germany	7,586	3.45	7.89	29	Sweden	5,376	2.44	77.49
3	Hungary	7,290	3.31	11.21	30	Switzerland	4,954	2.25	79.75
4	Czech Republic	6,657	3.03	14.23	31	Republic of Moldova	4,721	2.15	81.89
5	Slovakia	6,421	2.92	17.15	32	Bosnia & Herzegovina	4,678	2.13	84.02
6	Portugal	6,381	2.90	20.05	33	Georgia	4,639	2.11	86.13
7	Italy	6,330	2.88	22.93	34	United Kingdom	4,157	1.89	88.02
8	Bulgaria	6,192	2.81	25.74	35	Armenia	3,186	1.45	89.46
9	France	6,098	2.77	28.51	36	Ukraine	3,128	1.42	90.88
10	Austria	5,565	2.53	31.04	37	Viet Nam	2,133	0.97	91.85
11	Greece	5,408	2.46	33.50	38	Australia	2,071	0.94	92.80
12	Romania	5,394	2.45	35.95	39	Türkiye	1,507	0.68	93.48
13	Estonia	5,380	2.45	38.40	40	Serbia	1,145	0.52	94.00
14	Croatia	5,379	2.44	40.84	41	Albania	1,116	0.51	94.51
15	Malta	5,379	2.44	43.29	42	Iceland	1,082	0.49	95.00
16	Poland	5,377	2.44	45.73	43	Peru	1,077	0.49	95.49
17	Belgium	5,376	2.44	48.17	44	Costa Rica	1,069	0.49	95.98
18	Cyprus	5,376	2.44	50.62	45	Dominican Republic	1,010	0.46	96.43
19	Denmark	5,376	2.44	53.06	46	Cuba	936	0.43	96.86
20	European Union	5,376	2.44	55.50	47	Israel	931	0.42	97.28
21	Finland	5,376	2.44	57.95	48	Canada	860	0.39	97.67
22	Ireland	5,376	2.44	60.39	49	USA	763	0.35	98.02
23	Latvia	5,376	2.44	62.83	50	Republic of Korea	643	0.29	98.31
24	Lithuania	5,376	2.44	65.28	51	Iran	556	0.25	98.57
25	Luxembourg	5,376	2.44	67.72	52	India	530	0.24	98.81
26	Netherlands	5,376	2.44	70.16	53	Others	2627	1.19	100.00
27	Slovenia	5,376	2.44	72.61					
						World Total	**220029**	**100.00**	

Source: World Intellectual Property Organisation (2024).

Current status of geographical indications in India

The GIs registered in India show a positive and upward trend over the years, from three in 2004 to 643 in 2024 (Fig. 3). Agricultural commodities show a consistent number of GIs with significant growth in recent years, reaching 48 in 2023–24 (Fig. 4). Food stuff has relatively low numbers across the years, peaking at 19 in 2023-24. Handicrafts account for the highest number of GIs, with a noticeable peak in 2023–24 at 85. Manufactured and natural goods experience fluctuations but remain steady, peaking at 14 in 2021–22. Total GIs have grown substantially, from three in 2004-05 to 643 in 2023–24, showing a general upward trend. Of the total GIs registered in India, Handicrafts has a significant share (54 %) in total GIs, followed by Agricultural commodities (31 %), Manufactured and Natural goods (8 %) and foodstuffs (7 %) (Fig. 5). These numbers indicate a positive and upward shift towards agricultural commodities and handicrafts when compared to foodstuff, manufactured goods and natural goods with a notable increase in more recent years due to varying climatic conditions which influence Indias' agriculture and handicraft sector. In Northern India, GI Basmati rice fetches a higher price than non-GI Basmati rice and enhances the welfare of households (28). Similarly, Kerala GI rice significantly increased net income, marketed income and marketed surplus (29).

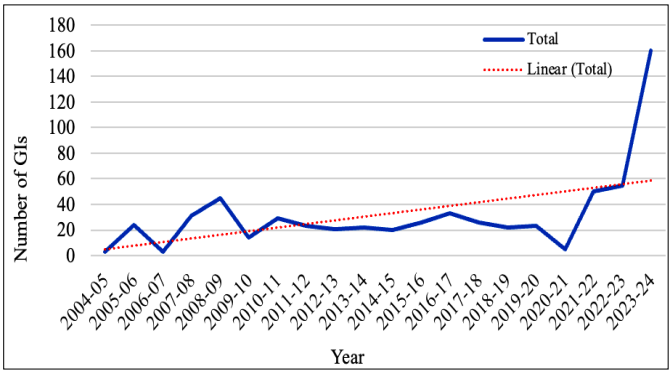

Fig. 3. Trend of Geographical Indications Registered in India (2004–2024).

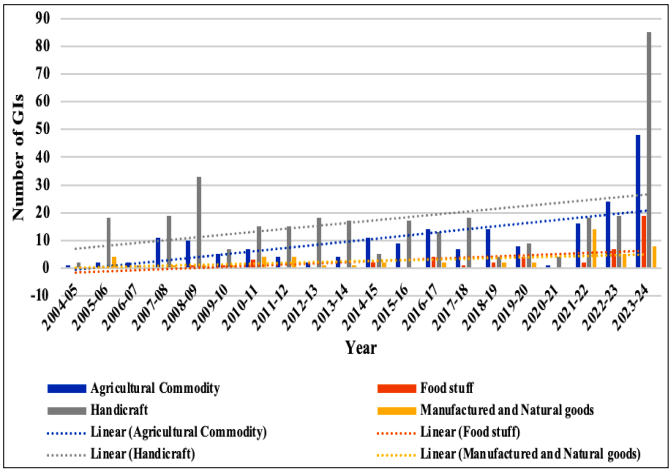

Fig. 4. Trend of Geographical Indication Product Categories in India during (2004–2024).

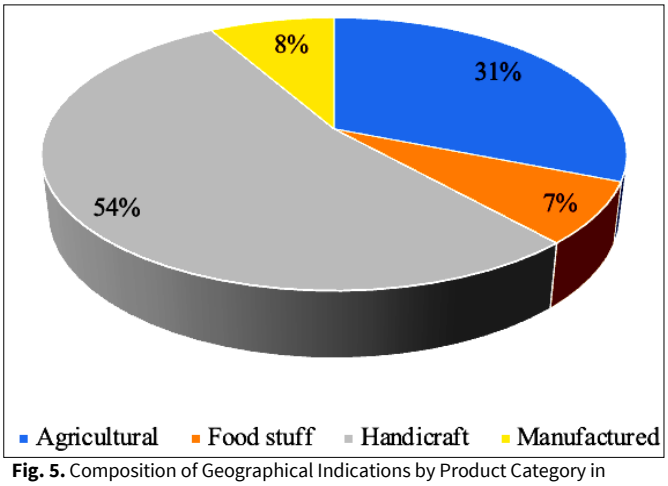

Fig. 5. Composition of Geographical Indications by Product Category in India, 2024.

Compound growth rate of geographical indications in India

Among the various categories of GIs in India (Table 4), Agricultural commodities have the highest CAGR of 10.63 %, followed by Foodstuffs (7.4 %), handicrafts (5.81 %) and manufactured and natural goods (4.72 %). The overall CAGR for all GIs was 5.76 % during 2004-24. Compared to China (The top contributor to GI globally), its CAGR is -5.56 % annually. This shows that India's GI growth is positive and increasing annually. This indicates that agricultural commodities have experienced the most substantial growth compared to all GIs.

Table 4. CAGR of GI products in India for the period 2004–2024

Sr. No.	GI Products	CAGR (%)
1.	Agricultural Commodities	10.63
2.	Handicrafts	5.81
3.	Food Stuffs	7.40
4.	Manufactured and Natural Goods	4.72
5.	All GIs	5.76

State-wise analysis revealed that the total number of GIs in India was 643, with the distribution spanning across Agricultural (200), foodstuff (47), Handicrafts (343), Manufactured and natural goods (53). Uttar Pradesh has the highest number of GIs in the distribution of GIs by state and product category, with 74 GIs, accounting for 11.51 % of the total primarily driven by handicrafts (Table 5). Tamil Nadu follows with 59 GIs (9.18 %), also dominated by handicrafts and foodstuffs. Maharashtra ranks third with 49 GIs (7.62 %), mainly in agricultural commodities (Fig. 6). Other key states include Karnataka (44 GIs, 6.84 %) and Kerala (35 GIs, 5.44 %), which are notable for Agricultural and Handicrafts GIs. The cumulative percentage shows how the GIs accumulate across states, with Uttar Pradesh, Tamil Nadu, Maharashtra, Karnataka, Kerala and Assam alone contributing (51.32 %) around half of the total GIs registered in India.

Conclusion

The global expansion of GIs has highlighted their crucial role in promoting regional economic development, cultural preservation and consumer protection. Through the protection of products tied to specific regions, GIs are a powerful tool in enhancing the reputation and marketability of local products. At a global level, GIs have seen considerable growth, with agricultural commodities and

Table 5. State-wise Distribution of Geographical indications in India (2004–2024)

States	Agriculture	Food stuff	Handicraft	Manufactured and Natural	Total	% (to total)	Cumulative Percentage
Uttar Pradesh	11	6	53	4	74	11.51	11.51
Tamil Nadu	14	8	35	2	59	9.18	20.68
Maharashtra	35	1	12	1	49	7.62	28.30
Karnataka	21	1	19	3	44	6.84	35.15
Foreign countries GI	0	5	1	32	38	5.91	41.06
Kerala	20	0	15	0	35	5.44	46.50
Assam	10	0	20	1	31	4.82	51.32
Gujarat	3	0	23	1	27	4.20	55.52
West Bengal	7	5	15	0	27	4.20	59.72
Odisha	4	5	16	1	26	4.04	63.76
Uttarakhand	15	1	9	1	26	4.04	67.81
Madhya Pradesh	4	3	14	0	21	3.27	71.07
Rajasthan	1	1	17	1	20	3.11	74.18
Andhra Pradesh	1	3	15	0	19	2.95	77.14
Arunachal Pradesh	4	1	11	3	19	2.95	80.09
Telangana	1	1	15	0	17	2.64	82.74
Two states with same GI	13	0	4	0	17	2.64	85.38
Bihar	6	1	9	0	16	2.49	87.87
Jammu & Kashmir	4	2	10	0	16	2.49	90.36
Goa	7	2	0	1	10	1.56	91.91
Himachal Pradesh	2	0	7	1	10	1.56	93.47
Chhattisgarh	2	0	5	0	7	1.09	94.56
Mizoram	2	0	5	0	7	1.09	95.65
Manipur	3	0	3	0	6	0.93	96.58
Meghalaya	3	0	2	1	6	0.93	97.51
Ladakh	2	0	2	0	4	0.62	98.13
Nagaland	3	0	1	0	4	0.62	98.76
Tripura	1	1	2	0	4	0.62	99.38
Puducherry	0	0	2	0	2	0.31	99.69
Jharkhand	0	0	1	0	1	0.16	99.84
Sikkim	1	0	0	0	1	0.16	100.00
Punjab	0	0	0	0	0	0.00	100.00
Total	**200**	**47**	**343**	**53***	**643**	**100**	

*From 53 (50 Manufactured and 3 natural goods) Source: Intellectual Property India (2024).

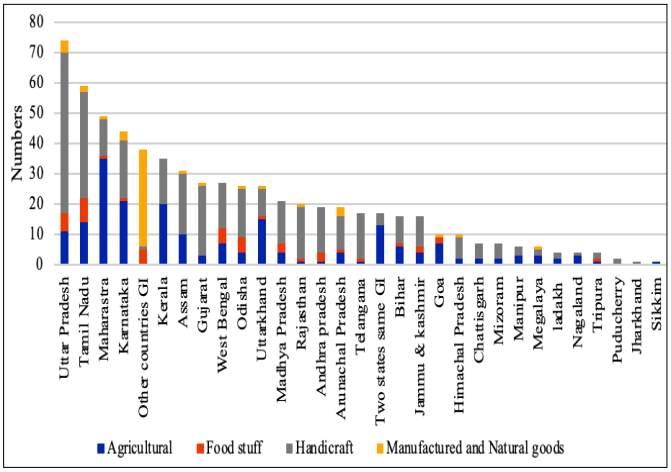

Fig. 6. State Wise GIs registered in India during 2024.

wines and spirits dominating the landscape. Countries like China, Germany and Italy have established themselves as key players in the GI sector, benefiting significantly from this system. China is the most significant contributor to global GI registrations. The GI system has gained substantial traction in India since the first GI registration in 2004. With a steady increase in GIs across diverse categories, particularly in agricultural commodities and handicrafts, India has positioned itself as an emerging player in the global GI market. States such as Uttar Pradesh, Tamil Nadu and Maharashtra have been at the forefront, contributing significantly to the country's GI landscape. However, progress in registering GIs in India has been slow compared to other economies.

needed to ensure fair access to the GI system for all producers. GI can lead to more monopolistic power favouring the most influential actors in the GI system and have disastrous consequences for small-scale farmers. To enhance the welfare of small-scale farmers, the more substantial the level of property rights protection, the greater the incentives for producers to develop Geographically Differentiated Agricultural Products (GDAP), which may also enhance welfare even after a GDAP has been created.

While the Indian GI system has shown tremendous potential, there is still considerable room for improvement, particularly in terms of awareness, education, policy support and research, which are needed to tackle challenges related to awareness, accessibility and enforcement. Policymakers should focus on developing frameworks that support small-scale producers, streamline the GI registration process and promote the economic benefits of GIs to rural economies. GI granting alone does not improve the welfare of farmers and support is also needed in the post-GI registration. Furthermore, enhancing international cooperation and the protection of GIs under global trade agreements will continue to play a lead role in ensuring their success in the worldwide marketplace. The future of GIs in India and globally appears promising. However, both national and international stakeholders need to address the challenges faced by smaller producers, promote greater consumer awareness and embrace technological advancements to unlock the full potential of GIs. This will contribute to the economic prosperity of regions and help safeguard the unique cultural heritage tied to traditional products worldwide.

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Authors' contributions

LTT conducted the survey, collected the data, analysed it and prepared the manuscript. MA guided the research, helped in formulating the concept and approved the final manuscript. All authors read and approved the final manuscript.

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Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Quill Bot in order to check grammar and spelling errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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