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Article

Geographical indications in Indian agriculture products: A pathway to sustainability and social development

Vikas Kumar

Indian Institute of Information Technology Vadodara-International Campus Diu, Diu 362520, India; vikas_kumar@diu.iiitvadodara.ac.in

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Abstract: Geographical Indications (GIs) are one of the important types of Intellectual Property Rights (IPRs) that are based on the geographical region. In light of this, the geographical region is vital for innovation to develop the regional economy and significant to understanding innovative performance in the particular region. With this context, the objectives of the paper are 1) to assess GIs products and sketch the historical development of GI in India; 2) to explore the scenario of agriculture products registered under the GIs; and 3) to address challenges of GIs during registration. Furthermore, the study is based on secondary data obtained from the Geographical Indication Registry of India. Findings: The study shows that the number of agricultural product registrations has increased in the last few years. This increase may be attributed to the new IPR policy regime and heightened public awareness.

Keywords: geographical indications; agriculture; IPR; policy; India

1. Introduction

The new Intellectual Property Rights were introduced in the year 2016 in India. The policy focused on creating public awareness about the economic, social, and cultural benefits of IPRs among all sections of society. It lays down the seven objectives: 1) IPR awareness; 2) generation of IPR; 3) legal and legislative framework; 4) administrative and management; 5) commercialization of IPR; 6) enforcement and adjudication; and 7) human capital development [1]. The impact is evident in India's ranking in the Global Intellectual Property Index, where it ranked 40th out of 53 countries. Although IPR scores jumped 2.42%, increasing from 36.04% (16.22 out of 45) in 2019 to 38.46% (19.23 out of 50) in 2020 [2].

The Indian government has made a focused effort to support investments in innovation and creativity through increasingly robust IP protection and enforcement. In this context, Geographical Indications (GIs) have been becoming one of the important tools to identify and protect regionally based products. However, GI products also have certain characteristics based on the manufacturing skills and traditions of a particular place of origin. For instance, Bnarasi Saree is handmade using local natural resources and is usually embedded in the traditions of local communities [3]. GI has been separated into five categories (i.e., Handicraft (including Textiles), Agricultural, Manufactured, Foodstuff, and Natural). The Registry started the registration process on 15th September 2003, and till now, 685 applications have been received, as shown in **Figure 1**.

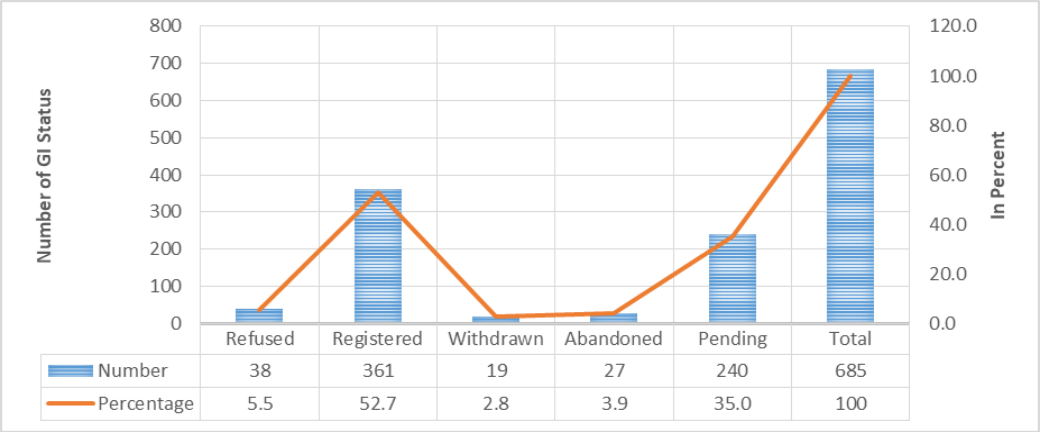

Figure 1. Status of geographical indication in India since 2004–2020.
Source: Calculated from the Geographical Indication Registry, 2025.

The figure above shows the total GI application received and out of 685, almost 53% of the application registered, and 35% of the applications are still pending. Besides this, almost 3% of the applications were withdrawn, also 5% and 4% of the applications were refused and abandoned respectively. However, now the registry has been more focused on conducting awareness programs in India to promote the registration of GIs. These areas are being focused on tea, coffee, spices, agriculture and horticulture products, handloom products, handicrafts, textiles, processed food items, dairy products, natural goods, spirits, and wines.

Further, agricultural products have qualities that belong to the specific region and geographical factors (i.e., climate and soil). It may be one of the reasons that most GI products are registered under agricultural products and foodstuffs. Broadly, this category of product has a specific geographical origin and possesses qualities or a reputation that has assigned a unique sign or logo. The qualities of the product depend on the geographical place of production, such as litchi from Muzaffarpur in Bihar, India. It is thus necessary to assess the status of GI products, especially agricultural products, in India. In light of this, the objectives of the paper are 1) to assess GIs products and sketch the historical development of GI in India; 2) to explore the scenario of agricultural products registered under the GIs; and 3) challenges of GIs during registration. In addition to this, the paper has been categorized into a different section to fulfill the objectives. In this regard, contextualizing the legal framework of GI and the historical development of GI in India is discussed in the second section. This is followed by a detailed discussion on the pattern of agricultural products protected so far under GI. The succeeding section discusses the issues and challenges of GI, especially for agricultural products. The last concludes the argument.

2. Geographical Indications: Concept and framework

In the 19th century, GI was started in Europe, and it is one of the elements of Trade-Related Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO). In the international framework, it is mentioned in Article 22 of the TRIPS agreement, which directs member countries to provide for the protection of all GI. On the other side, members should provide the ‘legal means for interested parties to secure the protection of their GIs’. According to Article 22 of TRIPS, GI is indications which

identify a good as originating in the territory of a member, or a region or locality in that territory, where a given quality, reputation, or other characteristics of the good is essentially attributable to its geographical origin [3]. The development of GI can be traced to the three international conventions, namely the Paris Convention, the Madrid Agreement, and the Lisbon Agreement [4], shown in **Figure 2**.

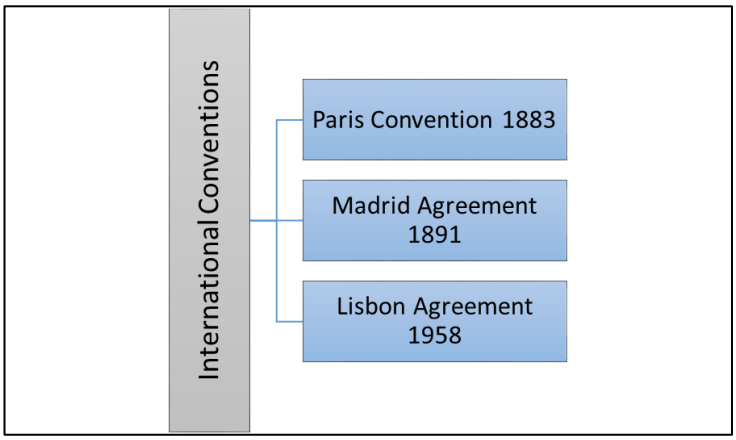

Figure 2. Development of Geographical Indications.
Source: Developed by author, 2025 based on the literature.

The Paris Convention for the Protection of Industrial Property (1883), the Madrid Agreement for the Repression of False or Deceptive Indications of Source of Goods (1891), and the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration (1958). The first two, the Paris Convention and Madrid Agreement**,** raise the "indications of source" and the Lisbon Agreement refers to "appellations of origin" as objects of industrial property [3]. Further, the 'indication of Source' reflects an indication of the origin of the product from a region or country (i.e., Make in India, Made in Japan, or Product of France, etc.). These indications do not show the quality of the product but refer to its origin. On the other hand, "Appellation of Origin" reflects a sign that specifies that a product is in a specific geographical place only when the characteristic qualities of the product are due to the geographical environment, including natural and human factors [5].

Similarly, India joined as a member state of the TRIPS Agreement, a sui generis legislation for the protection of Geographical Indications. This Geographical Indication Act was passed in the parliament in the year 1999 and the Geographical Indications of Goods (Registration and Protection) Rules, 2002, came into force in the year 2003 [5]. Broadly, there were three objectives behind the Geographical Indications of Goods (Registration and Protection) Act, 1999 passed, first, "it is a specific norm in the country that could effectively protect the interest of producers of such products; second, to protect from illegal persons from misusing Geographical Indications and save consumers from deception; and finally, to promote products bearing Indian Geographical Indications in the export market" [4].

GIs are Intellectual Property Rights, that are farmer-friendly and mitigate information asymmetry in agri-food transactions by providing consumers with origin and quality information [5]. GI protection is intended for a group of persons residing in a locality using the name (title). It is the reputation of the product based on its quality

that is attained due to geographical factors and prolonged use that makes a GI different from a trademark [6]. GIs provide uniqueness to the product while preserving the authenticity and increasing the market value; they find a way to sustainable farming, increase local employment, and prevent counterfeiting. They also stated that GI-tagged products have higher economic value domestically and internationally [7]. The GIs also boost local tourism and employment opportunities, supporting economic growth [8]. GI in India can be divided into three basic categories: Agri-food, natural commodities, handicrafts, and/or industrial items [9].

According to the UN Food and Agriculture Organization's 2014 report on GIs: "Adding Value to Agricultural Products, the market share of Cognac brandy was only 1% of global brandy sales in 1960, but exceeded 50% by 2014". In another report from the French Ministry of Agriculture in 2014, it is estimated that the production and sales of Roquefort blue cheese could help generate around 500 formal job positions in the Aveyron region. In economics, GIs are considered to promote rural development mainly through two mechanisms—reducing information asymmetry and enabling a degree of monopoly power for producers. While countries like France and Italy have a GI system well established and benefits small farmers, India faces awareness and legal challenges [10].

GI-labeled tea and rice in China have considerable economic profits for local producers [11]. European nations have gained from GI-tagged cheeses and wine, substantial enough to stand in global markets. Talking about India, Tea from Darjeeling and Basmati Rice are internationally recognized, but economic benefits vary due to legal challenges and marketing [12]. GI faces several challenges too, as unawareness, localities, and farmers are unaware of the economic potential of GI identification. Forged and mislabelled products in the market, declining the authenticity. Indian GI products lag behind in global competition due to trade regulations and branding issues [13].

Further, the Geographical Indication Registry was established in 2003 in Chennai, India, to regulate GI products and conduct awareness programs to promote the registration of GIs. It focused on products like tea, coffee, spices, agricultural products, handloom products, handicrafts, textiles, processed food items, dairy products, natural goods, spirits, and wines. With this context, the Registrar of Geographical Indication is categorized into two sections, i.e., Part 'A' which includes particulars relating to registered Geographical Indications, and Part 'B' which refers to particulars of the registered authorized users [14]. The registration process is shown in the **Figure 3** given below:

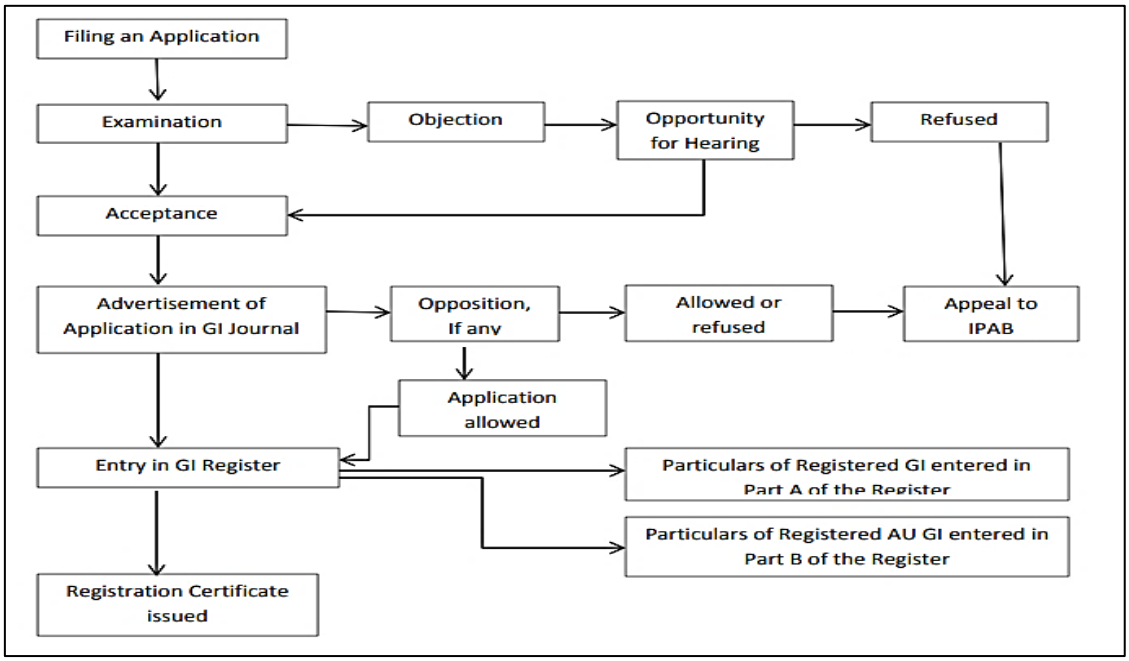

Figure 3. GI registration process under the GI Act 1999 in India.
Source: Geographical Indications Registry, 2020.

The figure above shows the registration process of GI products as per the norms of IPR. The registration of products can be applied by any association of persons, producers, organizations, or authority established by or under the law. The applicant must represent the interests of the producers. The application should be in writing in the prescribed form and addressed to the Registrar of Geographical Indications along with a prescribed fee. Hence, the next section analyzes the pattern of registered agricultural products.

3. Methods

The approach of research is exploratory. It compares the categories of the product and their origin of GI products. In addition, the work maps the sources of GI products, especially agricultural products. This research consists of a comparison between agricultural products and other GI products. The data was collected from the Geographical Indications Registry and descriptive statistics analysis such as frequency tables, bar charts, pie charts, and percentages was used to summarize the result. The period of the data collected was from 2004 to 2020. The period was chosen for analysis because it was established in 2003 to regulate GI products and conduct awareness programs for registering GIs. Besides this, literature, articles, and government reports were also accessed to understand the agricultural GI products and how policy influences innovation in the region. The analysis consists of four parts. Firstly, the agriculture GI products and their contribution to the total GI registered; secondly, the state-wise contribution of agriculture products and other GI products registered; thirdly, the year-wise trend of agriculture products; and fourthly, the issues related to agricultural GI products are discussed. In addition to this, through regression analysis between the government budget and agricultural products. The prediction graph for Random Forest Regression displays a strong correspondence between the predicted

and actual data points. It also achieves an R^2 score of 0.8710, demonstrating strong predictive power.

4. Result and discussion: GIs product registered

There was a total of 361 products registered under the GI Protection Act till March 2020. Out of this, 109 GI products were related to agriculture, and 208 GI products were related to handicrafts. Similarly, other types are manufacturing, foodstuff, and natural; the numbers of registered products under these categories are 24, 18, and 2, respectively. On the other hand, it can be seen from the figure given below that 57% of GI products are registered under the types of handicrafts, including textiles, and 30% are registered under agriculture. The rest of the types, such as manufactured, foodstuff, and natural, are 6, almost 5, and less than 1% registered accordingly. The details are shown in the **Figure 4** below.

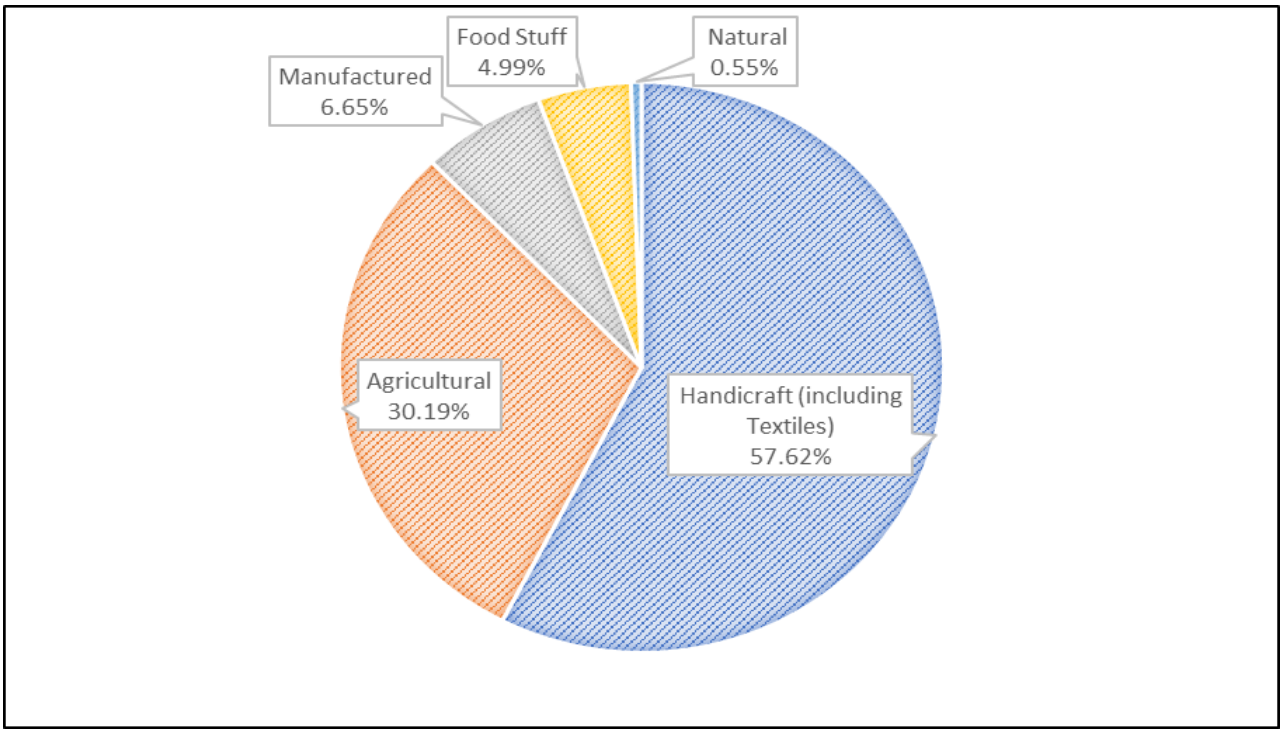

Figure 4. Percentage-wise GI products registered in India till March 2020.
Source: Author compilation from GI Registry, 2020.

4.1. Agriculture products registered under the GIs

There is a total of 361 GI products registered from 2004 to 2020. It is interesting to see the effects of the new IPR policy 2016, and data indicates that agriculture-related products are highly registered. This may be due to the effect of the awareness program run by the Government of India. It can be seen from the table given below that the highest number of agriculture products registered is 14 in the years 2016–2017 and 2018–2019. However, the registered number of agricultural products is continuously increasing. For instance, in the year 2004–2005, the number of Agriculture products is 1 and till March 2020, it is 6, as shown in **Table 1**.

Table 1. Number of agriculture products out of total GI products.

Year	Number of Agriculture-Related Registered GI	Total Number of Register Products under GI	Percentage of Agriculture Registered out of Total GI Products
2004–2005	1	3	33.33
2005–2006	2	24	8.33
2006–2007	2	3	66.67
2007–2008	11	31	35.48
2008–2009	10	45	22.22
2009–2010	5	14	35.71
2010–2011	7	29	24.14
2011–2012	4	23	17.39
2012–2013	2	21	9.52
2013–2014	4	22	18.18
2014–2015	11	20	55.00
2015–2016	9	26	34.62
2016–2017	14	33	42.42
2017–2018	7	26	26.92
2018–2019	14	23	60.87
2019–2020	6	18	33.33
Total	109	361	30.19

Source: Author compilation from GI Registry, 2020.

On the other side, the percentage of registered agriculture products out of the total is shown separately in the figure given below. It can be observed from the figure, and maybe it can be said that, after the new IPR policy regime, the contribution of agricultural products is increasing. For instance, in the year 2018–2019, it increased to almost 61% from nearly 27% in the year 2017–2018. Further, a total of 30% of agriculture products contributed to the total GI registered. In the year 2006–2007, it shows a high percentage because in that particular year, only 3 GI products were registered, and of these, 2 products are agriculture-related. It can be seen in **Figure 5**.

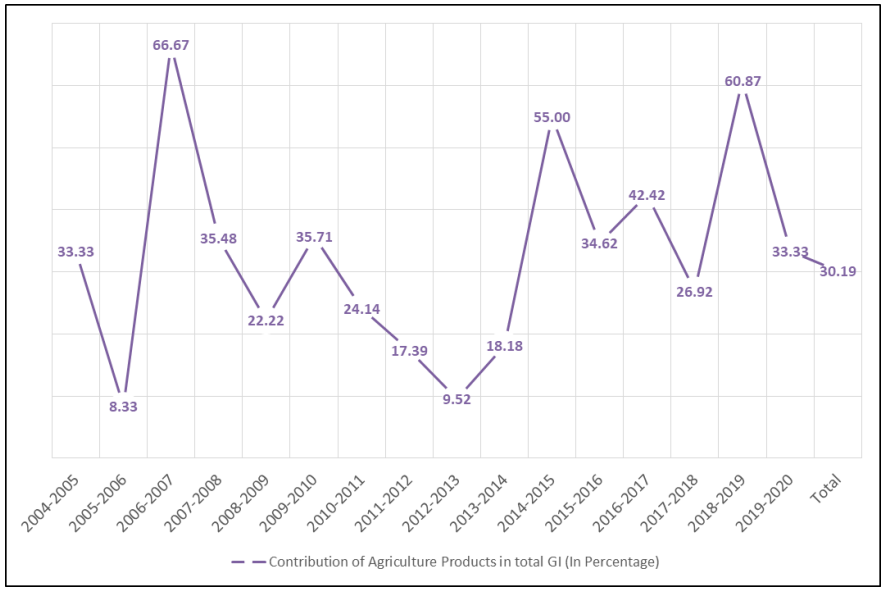

Figure 5. Percentage of agriculture products contribution in total GI registered products from April 2004–March 2020.

Source: Author compilation from GI Registry, 2020.

4.2. State-wise agriculture products registered under GI products

It is important to see state-wise registration of the product. It covered the different states of India and other foreign countries. In the **Table 2**, it can be seen that 346 products were registered from Indian states, and 15 GI products were registered from foreign countries. Out of 346, 109 products belong to the agriculture registered. In the view of agriculture products, the highest number of registered product states are Maharashtra, Karnataka, and Kerala, i.e., 24, 17, and 13, respectively. On the other hand, other states such as J&K, Madhya Pradesh, and Rajasthan do not have any registration-related agriculture GI products. Therefore, it is necessary to pay attention to these states and make more awareness programs related to agriculture.

Table 2. Regional contribution of agriculture products and other GI products registered under the GI Act from April 2004–March 2020.

State	Number of Agriculture-Related Registered GI	Total Number of Register Products under GI	Percentage of Agriculture products Registered out of total GI Products
Andhra Pradesh	2	18	11.11
Arunachal Pradesh	1	2	50.00
Assam	6	8	75.00
Bihar	4	13	30.77
Chhattisgarh	1	6	16.67
Goa	1	2	50.00
Gujarat	2	15	13.33
Himachal Pradesh	2	8	25.00
International	0	15	0.00
Jammu&Kashmir	0	7	0.00

Table 2. (*Continued*).

State	Number of Agriculture-Related Registered GI	Total Number of Register Products under GI	Percentage of Agriculture products Registered out of total GI Products
Karnataka	17	41	41.46
Kerala	13	28	46.43
Madhya Pradesh	0	10	0.00
Maharashtra	24	30	80.00
Manipur	1	4	25.00
Meghalaya	2	2	100.00
Mizoram	1	6	16.67
Nagaland	2	3	66.67
Odisha	2	17	11.76
Pondicherry	0	2	0.00
Rajasthan	0	14	0.00
Sikkim	1	1	100.00
Tamil Nadu	8	35	22.86
Telangana	0	14	0.00
Tripura	1	1	100.00
Uttar Pradesh	3	26	11.54
Uttarakhand	1	1	100.00
West Bengal	6	21	28.57
India	8	11	72.73
Total	109	361	30.19

Source: Author compilation from GI Registry, 2020.
Note: Here in the table, India means those products that are shared and registered by two or more than two states, and international means those that are registered by foreign countries.

On the other hand, the states like Maharashtra, Assam, and Nagaland are the highest contributors. For instance, Maharashtra contributes 80%, Assam contributes 75%, and Nagaland contributes 66%. Similarly, other states like Kerala and Karnataka contribute 46% and 41%. However, those states represent 100% because there is only one GI product, and that is also in agriculture products. There are other states, such as Uttar Pradesh, Andhra Pradesh, Orissa, etc., that have a lower contribution, but these states have other GI products. It can be seen in **Figure 6**.

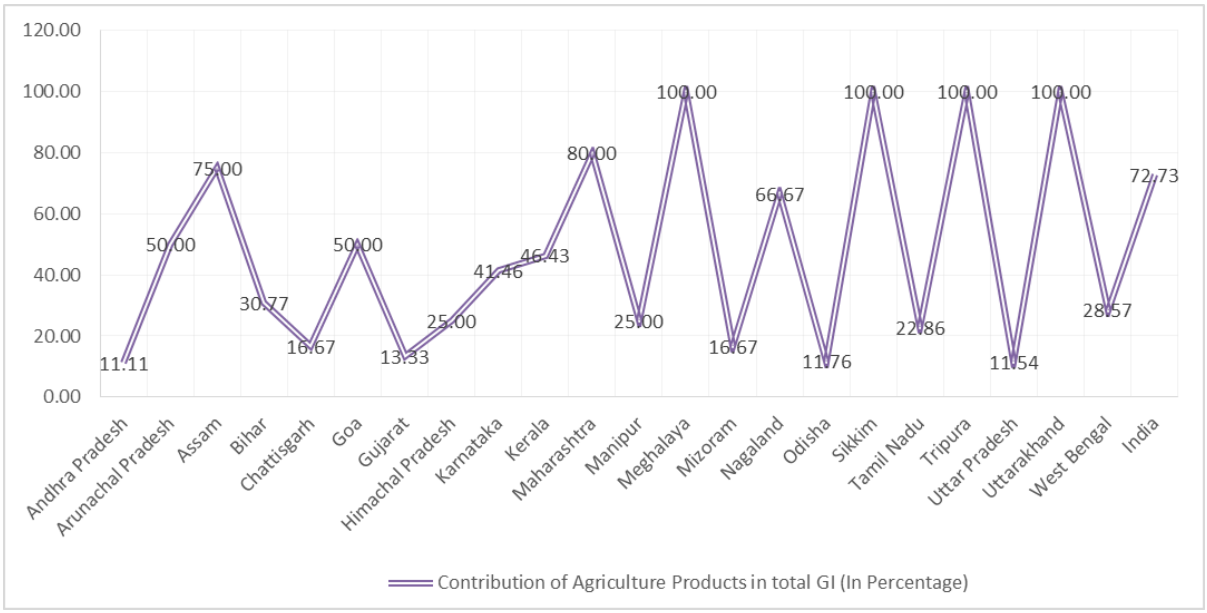

Figure 6. Contribution of agriculture products to the total GI registered by the state from April 2004–March 2020.

Source: Author compilation from GI Registry, 2020. Note: The total of 109 takes into consideration only those States that have registered some agricultural products with GI. Some States have no agricultural products registered with GI. If those States are included the total goes up to 361. It may be noted that this total excludes foreign products registered with GI Registry. Here in the figure, India means those products that are shared and registered by two or more states.

4.3. Trend of agriculture products registered

The trend analysis only shows the agriculture products registered under the GI Act by the states. It has been categorized into 4 series to check the effect of the new IPR regime and other associated programs in the states. It can be observed from the **Table 3** that, from 2016 to 2020, most of the states have registered their agriculture products. During the period of 2016–2020, states like Maharashtra, Karnataka, Kerala, Assam, and Bihar took more initiatives in GI registration, especially agriculture products. Further, there are some other states also that have taken initiatives and registered at least one agriculture-related product. This may be due to the awareness and participation of other stakeholders.

Table 3. Trend of agriculture products registered under GI Acts.

State	Year			
	2004–2008	**2008–2012**	**2012–2016**	**2016–2020**
Andhra Pradesh		1		
Arunachal Pradesh			1	
Assam		1	2	3
Bihar				4
Chhattisgarh				1
Goa				1
Gujarat		2		
Himachal Pradesh	1			1
Karnataka	7	5	2	5
Kerala	2	5	2	4

Table 3. (*Continued*).

State	Year			
	2004–2008	**2008–2012**	**2012–2016**	**2016–2020**
Maharashtra		2	8	14
Manipur			1	
Meghalaya			2	
Mizoram			1	
Nagaland		1	1	
Odisha		1		1
Sikkim			1	
Tamil Nadu		4	1	2
Tripura			1	
Uttar Pradesh	1	1	1	
Uttarakhand				1
West Bengal	1	3		2
India	4		2	2
Total	16	26	26	41

Source: Author compilation from GI Registry, 2020. Note: The total of 109 takes into consideration only those States that have registered some agricultural products with GI. Some States have no agricultural products registered with GI. If those States are included the total goes up to 361. It may be noted that this total excludes foreign products registered with GI Registry. Here in the table, India means those products that are shared and registered by two or more than two states.

On the other hand, a total of 109 agriculture products have been registered from 2004 to 2020, and Maharashtra contributes 22% of agriculture products registered as GI, which is higher than any other state. Similarly, the states such as Chhattisgarh, Goa, Uttar Pradesh, etc., have registered below 1%. The details are shown in **Figure 7**.

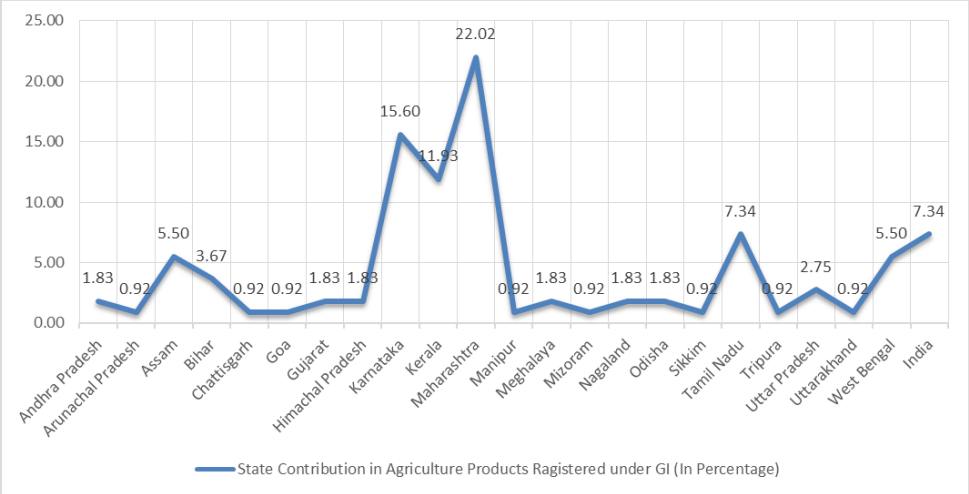

Figure 7. Overall contribution of the state in total agriculture-related products.

Source: Author compilation from GI Registry, 2020. Note: The total of 109 takes into consideration only those States that have registered some agricultural products with GI. Some States have no agricultural products registered with GI. If those States are included the total goes up to 361. It may be noted that this total excludes foreign products registered with GI Registry. Here in the figure, India means those products that are shared and registered by two or more states.

Relationship between agriculture union budget and agricultural GIs products

The prediction graph for Random Forest Regression displays a strong correspondence between the predicted and actual data points, with minimal prediction errors. This indicates that the model effectively captures the relationship between the budget and the number of registered GIs, showcasing its reliability in regression tasks. The details can be seen in **Figure 8**.

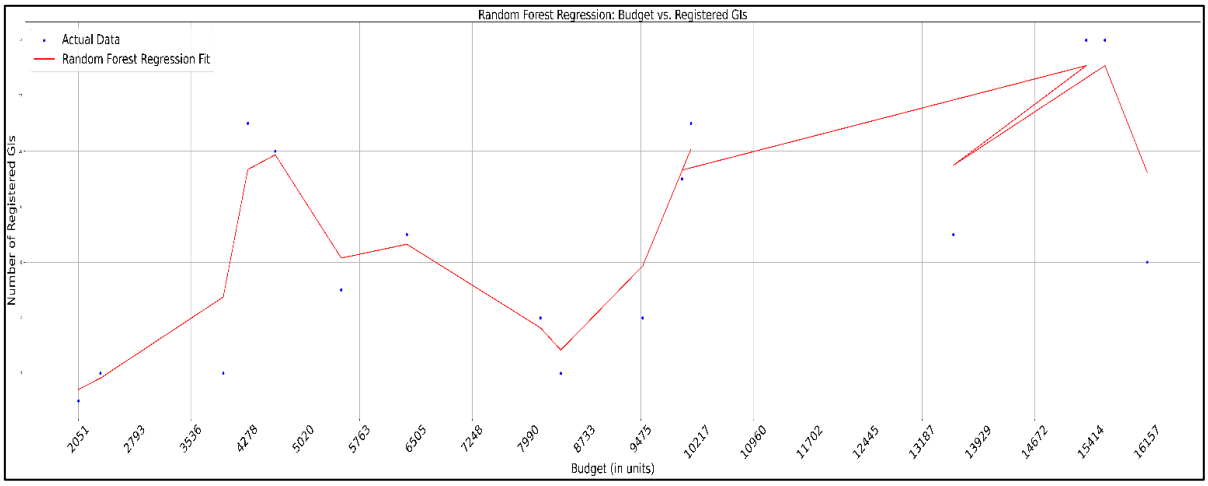

Figure 8. Random Forest Regression: Budget vs. registered agricultural GIs products.
Source: Author, 2025.

The Random Forest Regression model achieves an R^2 score of 0.8710, demonstrating strong predictive power. It performs exceptionally well in both regression and classification tasks, but the confusion metrics indicate the potential for improvement in classifying boundary cases through further parameter optimization or feature engineering. The details are shown in **Figure 9**.

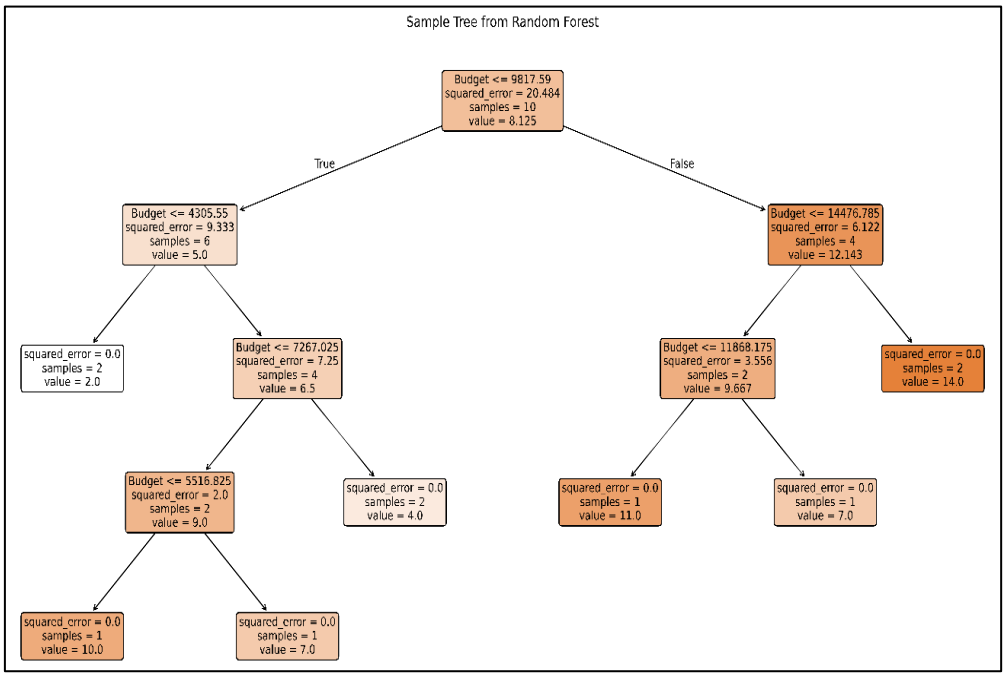

Figure 9. Sample tree from random forest.
Source: Author, 2025.

The confusion matrix reveals an overall accuracy of 81.25%, with precise classification in the "Low (0–5)" and "High (10+)" categories, while some misclassifications occur in the "Medium (5–10)" range. This suggests that the model is consistent but could benefit from fine-tuning to reduce errors in overlapping bins. The details are shown in **Figure 10**.

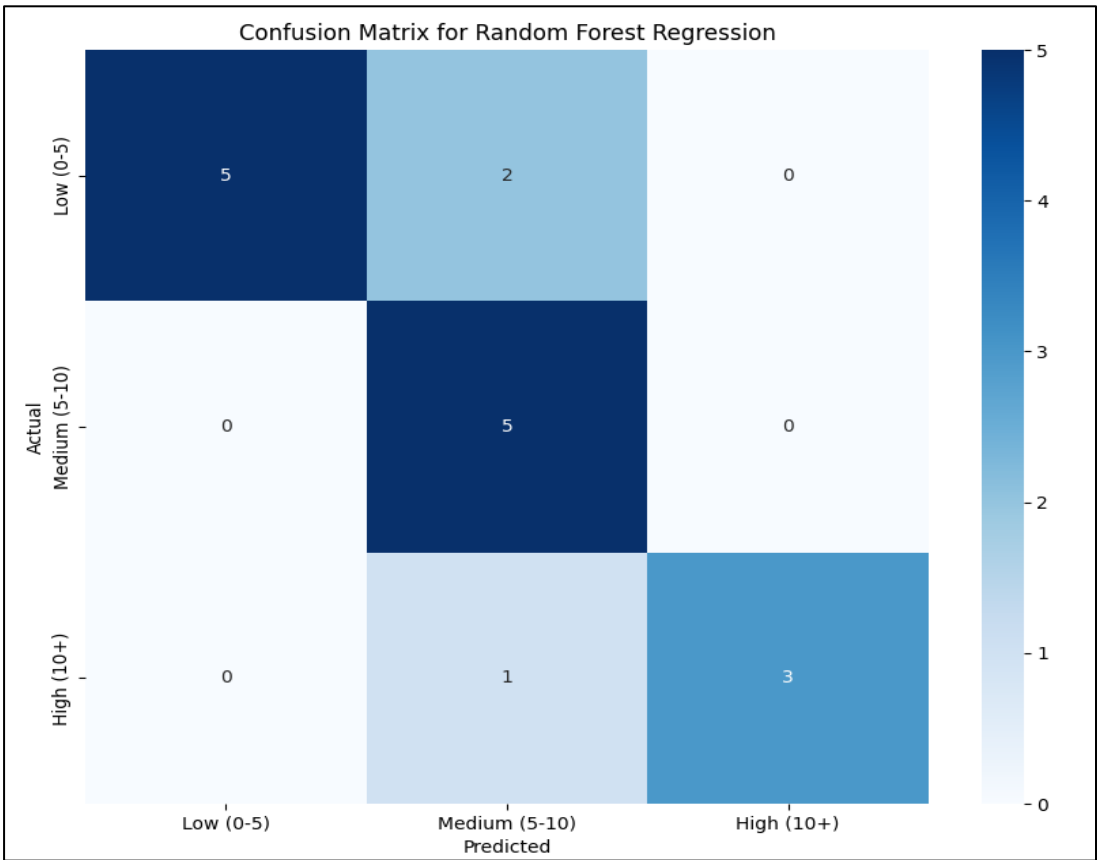

Figure 10. Confusion matrix for Random Forest Regression.
Source: Author, 2025.

5. Issues of agricultural GI products

The registration of agriculture products under the GI Act helps to enhance income as an incentive for individual farmers or institutions. Despite this fact, there are some issues and challenges, i.e., GI logo, awareness, file processing, etc., which need to be tackled. However, these issues may vary from region to region and product to product.

5.1. Commercialization of products

The commercialization of GI products is one of the major issues, especially for agriculture products. According to Naidu [15] not all harvested products are necessary to export; only a certain quantity of product is liable to export. Therefore, the rest of the quantity is sold in the domestic market only. In this context, farmers do not get the benefit as much as they can because of the difference in price between the domestic and international markets [16].

5.2. Lengthy file processing and awareness of the norms

The new IPR Policy 2016 mentioned the lack of awareness and the perception that IP protection is either not required or that the process to obtain it is unnecessarily complicated [5]. As it is known, to register the product, several processes go through various steps that are very complex for a farmer or any layperson. Therefore, because of the complexity, the farmers or institutions have less interest in getting into the process. In addition to this, some farmers are not aware of the norms because of less education. Hence, there is also a need to be concerned about those states where the education level is low. An empirical study conducted in Tamil Nadu and also stated that most of the producers of agricultural and food products (47.97%) have a low level of awareness about GI and its associated benefits [17].

5.3. Identification of GI products

The symbol of the GI product is not equal or common in India; it varies from region to region. Therefore, it is difficult for consumers to identify GI products. In this context, Lalitha and Vinayan [17] argued that despite more than one decade of the Act, there is still a lack of a common logo for all GI products, which affects the awareness of its importance. For instance, another country like Thailand has one common logo, which is easily known by consumers as an indicator of quality and uniqueness [18]. The policy at various levels should focus on IP protection of agriculture products that help in investment and publication and can play a key role in the public domain or awareness about the product [19].

6. Conclusion

India is a country where agriculture is playing an important role in the economy. With this context, geographical indication products, especially agricultural products registered under GI, will boost the economy directly or indirectly. However, it is not intended to argue whether GI is boosting the agriculture sector or not, but based on the data, it can be stated that the registration of products is increasing, especially for agriculture-related. For instance, 30% of agriculture products are registered under GI. Since 2016, the number of products related to agriculture has almost doubled; it has increased up to 41 in 2016–2020 from 26 in 2012–2016. This may be due to government initiatives and programs like Creative and Innovative India, Make in India, etc. However, it has some hurdles, such as the GI logo, file processing, or commercialization of products that need to be tackled. In this sense, there is a need to focus on each state to recognize their unique products in agriculture because, as a data concern, there are few states like Madhya Pradesh, Jammu, Kashmir, Telangana, etc. with still no agriculture products registered under GI.

Conflict of interest: The author declares no conflict of interest.

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