

Protection of geographical indication products and sustainable agricultural development: The role of public policies

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Abstract: This research employed co-word clustering analysis to classify 62 geographical indication (GI) protection policies from 2009 to 2023 into three distinct types. Employing Sankey diagrams, we dynamically analysed the evolution of these policy tools. These insights provide valuable experiential guidance for reforming and innovating China's GI protection system and agricultural sustainable development.

Keywords: agricultural sustainability; policy tool; Sankey diagram; agricultural sustainability

The protection of geographical indication (GI) products, as an essential tool for promoting high-quality development of the agricultural economy and guaranteeing ecological security, has always been highly valued by all countries. China initiated the development and protection of GI resources relatively late, and numerous problems have emerged during the development process, making it challenging to effectively promote many related policies. In such a context, to maximise the value of GIs, the Chinese government has introduced several policies in recent years to strengthen the development of GI products. Previous experience has shown that the intensity of policy implementation usually affects the effectiveness of the protection of geographical indications. For instance, with strong government backing, China has now reached a total of 10 124 GI products, yielding a direct output value of over USD 133 bil-

lion, significantly boosting the agricultural economy (Li et al. 2023). It can be seen that the corresponding policy of GIs, such as the communication, implementation, and extension of the government's will, and its specific policy design, will inevitably intervene in the preferences and behaviours of multiple subjects. However, as the implementation of GI policies in China has started relatively late, the specific transmission paths of the relevant policies and the effectiveness of the various policy tools in different periods still await to be explored. Therefore, a systematic analysis of the GI policy will not only identify the emphasis of GIs at various stages of development more intuitively but also grasp the synergistic mechanism of the evolution of GI policy with the development pattern. This study focuses on the policy of protection of GIs in China and analyses the evolutionary path of the policy tools to clarify the key points and the current status of the GI policy.

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In particular, we explore the following two main issues. What is the quality of GI protection policy texts? What are the evolutionary characteristics of policy pathways and policy instruments? The study aims to analyse the evolutionary characteristics of policy tools and assess the degree of policy goal achievement and implementation effectiveness, ultimately contributing to the sustainable development of GI products.

Literature review. The current literature research on GI protection mainly focuses on the two aspects of law and economics. Studies based on the law aspect mainly involve the development of the protection system of GIs, and the choice of protection modes of various countries. For instance, the European Union has rich experience in protecting GIs, with Switzerland, France, and Germany employing specialised legal models to ensure the quality and reputation of GI products. This serves as a crucial guideline for other national and regional authorities when devising their strategies for GI protection (Li et al. 2024a). Studies based on the economic development level are mainly concerned with the economic benefits of GI protection, brand building of GIs (Pamukcu et al. 2021), regional industrial development (De Rosa et al. 2023).

In recent years, scholars have been continuously exploring the application of policy tools in practice. Rothwell and Zegveld (1984) referenced the effectiveness of tool implementation, and categorised policy tools into environmental, supply-oriented, and demand-oriented types. Zhao and Ye (2022) found that a combined strategy of policy tools represents the optimal approach for advancing local enterprise innovation policies. Stewart (1996) argued that each tool has an optimal level of promotion.

In summary, while the existing research on GI protection and policy tools is relatively well-established, there is currently a notable gap in the literature specifically addressing GI protection from the perspective of policy tools. Therefore, this study systematically reviews the GI protection policies issued by the Chinese government. By conducting a deep and systematic analysis of the evolutionary process of these policies in conjunction with the three types of policy tools, this study aims to offer a fresh perspective for enhancing GI protection.

MATERIAL AND METHODS

Policy tools are the means and methods employed to achieve policy objectives (Krause et al. 2019). This article constructs an X-Y two-dimensional framework through legislative document types and legislative

goals, unveiling the operating mechanism of policy tools related to GI protection.

Research design

To systematically conduct this research, we have developed a comprehensive research design plan, which mainly includes the following two aspects:

Data sources

On October 23, 2006, the AQSIQ issued the Regulations on the Protection of Geographical Indication Products [Notice (2006) No. 85], marking the establishment and strengthening of China's GI protection system. Since then, the government has continuously increased efforts in GI protection, with relevant policies and measures being continuously improved. In light of this, our study focuses on the central and provincial governments. Using keywords such as 'geographical indication' and 'GI product protection', we conducted a systematic and comprehensive search for GI product protection policies issued after 2006. To ensure comprehensive coverage, we utilised professional policy databases and supplemented our search through relevant Chinese government portals, collecting a total of 302 policy documents. These documents cover multi-level and multi-dimensional policy information from the national to the local level.

To enhance the focus and precision of our study, we established the following policy screening criteria: Firstly, policy texts must directly address specific means and measures for GI product protection. Secondly, issuing entities are limited to national agencies, ministries, and provincial governments. Lastly, we primarily select formal decision-making texts such as laws, regulations, notices, and opinions, excluding informal ones like approvals and replies. As of June 30, 2023, after careful screening and comparison, we have identified 62 representative policy documents as the core samples for this study.

Research methods

i) Text mining approach. The text mining approach is a method for extracting valuable content from unstructured text information. It demonstrates unique and significant advantages in analysing the characteristics of policy texts. Compared with traditional manual reading and organisation methods, this approach is more scientific and objective. Based on existing research findings, this study used ROSTCM 6.0 software to extract co-word analysis elements from various policies and determine corresponding policy tools accordingly (Mukherjee 2021).

ii) Co-word analysis method. The co-word analysis method was first proposed by Callon et al. (1983). This method explores the relationships between keywords by calculating the frequency of the same phrases appearing in the same document. To identify core vocabulary within policy texts, high-frequency words are used as proxy terms. This study used Python to count the word frequency in 62 policy texts, selecting specific clauses directly related to the use of policy tools for protecting geographical indications as analysis units, and counting the frequency of these units. Ultimately, 100 analysis units were obtained.

This study constructed a database based on 62 documents and encoded the specific provisions of the policies as the initial units. To ensure coding reliability, we selected two coders to independently code the chosen policy samples, ultimately forming 100 analytical units. During the coding process, we were fully aware of the potential impact of coder disagreement on the results. Therefore, we employed specific formulas to calculate the consistency and reliability of the coding results. In Equation (1), M represents the number of codes on which both coders agreed, while $N1$ and $N2$ represent the number of codes agreed upon by each coder respectively. In Equation (2), n denotes the number of coders involved, and A represents the agreement level between coders. It is generally believed that when the consistency coefficient reaches or exceeds 0.8, there is high agreement between coders, and the coding results are highly reliable (Li et al. 2024 b). After calculations, this study found an agreement level (A) of 0.925 and a reliability (R) of 0.907, both exceeding the commonly accepted threshold of 0.8, indicating that the coding results are highly reliable. Furthermore, to address potential inconsistencies that may arise during the coding process, we conduct cross-checks upon completion. For documents with disagreements, we invite a third expert to conduct an independent assessment based on the original policy documents and classification standards, in order to make the most reasonable classification decision.

$$A = \frac{2M}{N1 + N2} \quad (1)$$

$$R = n \times \frac{A}{1 + [(n-1) \times A]} \quad (2)$$

where: A – the agreement level between coders; M – the No. of codes on which both coders agreed; N – the No. of codes agreed upon by each coder; R – reliability; n – the No. of coders involved.

Framework of analysis

Dimension X – type of legislation documents.

The functions, purposes, and implementation methods of GI protection policies vary. This study broadly categorises these policies into three types based on whether they provide macro-level guidance, specific operational guidelines, or implementation details and support. The first type is notification and opinion, which are mainly aimed at planning for the successful implementation of the protection of GIs. The second type is the plan and regulation, mainly the guidelines and protection programs formulated by the government and relevant departments for GI products. The third type is the provision and method, which elaborates on the implementation rules and priorities of GI protection work.

Dimension Y – targets of the legislation. The classification of policy tools allows for a deeper understanding of the dominant approach and policy evolution in GI protection. We adopt Rothwell and Zegveld's classification of policy tools as the basis. Taking into consideration the characteristics of GI protection and the practical application of policy tools, this study further subdivided them into 15 policy tool categories, as illustrated in Figure 1.

i) Supply-oriented tools. Supply-oriented tools represent the proactive approach of government policies towards GI protection. These tools include measures such as investing in subsidies for GI protection, providing information support, enhancing technical support, fostering talent, and infrastructure construction.

ii) Demand-oriented tools. Demand-oriented tools represent the pulling force of government policies towards GI protection. For example, they include measures such as reducing trade barriers, government procurement, overseas institutional management, demonstration projects, and other protective measures to stimulate market demand.

iii) Environmental-oriented tools. Environmental-oriented tools represent the impact of government policies on GI protection. For example, through measures such as improving the standard system of GI protection, implementing tax incentives, setting target planning, strengthening legal regulations, adopting strategic measures, and providing financial support, the government creates a conducive policy environment for the protection of GI products.

In summary, supply-oriented, demand-oriented, and environmental-oriented tools collectively drive the development of GIs (Figure 2).

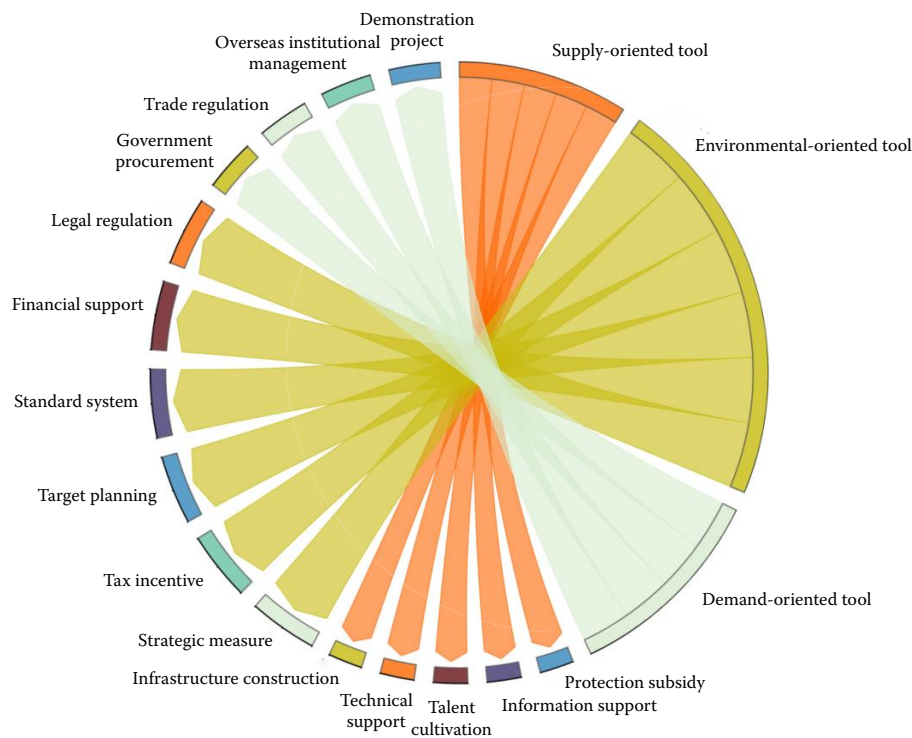


Figure 1. Policy tools and their categorisation

Source: Compiled by the authors

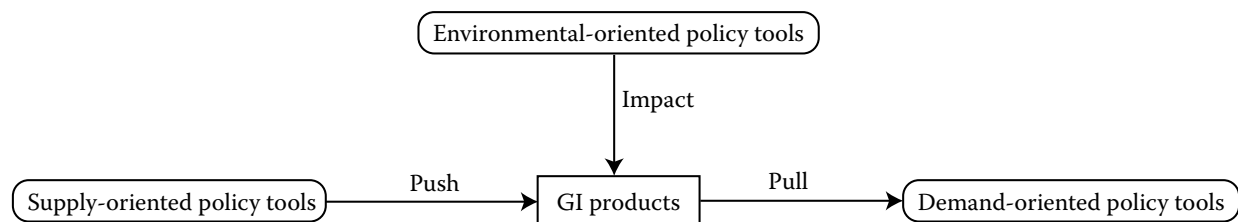


Figure 2. Mechanisms of policy tools for GIs

GI – Geographical indication

Source: Compiled by the authors

Based on the content composition of the X and Y dimensions, a two-dimensional analytical framework targeting GI policies is determined, as shown in Figure 3.

RESULTS

Dimension X

Through frequency statistics on the text of 62 selected policies from 2009 to 2023 (Figure 4), we found that the majority of the text of GI protection policies were of the notification and opinion type, accounting for 36 documents (58%). The second-highest number was the plan and regulation type, with 16 documents (26%), followed by 10 documents (16%) of the provision and method type. Among them, the notification and opin-

ion type had the highest proportion in 2009 (100%), but its share shows a decreasing trend over the years. The plan and regulation type exhibited the highest proportion in 2020, with relatively stable fluctuations. The provision and method type exhibited the highest proportion in 2019, with the smallest fluctuations. Additionally, comparing the number of issued documents in each year, we found that there were more documents in 2011 (7 documents) and 2015 (10 documents). This may have been related to events such as the Central Economic Conference and the Two Sessions.

Dimension Y

Figure 5 shows the continuous adjustments in the proportion of policy tools. In general, the highest

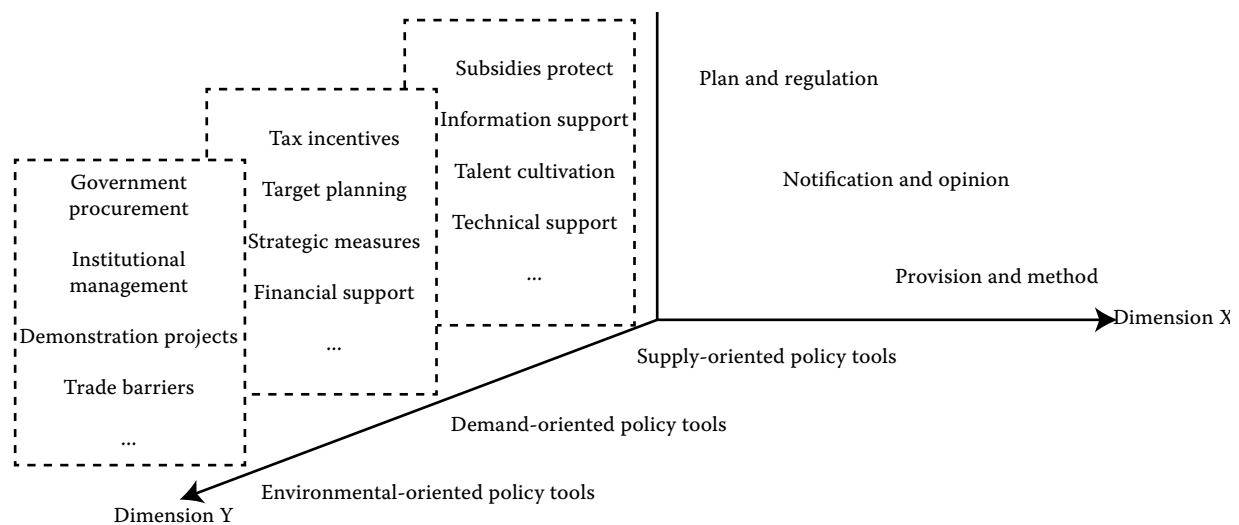


Figure 3. Framework for analysing policies on GI protection

GI – Geographical indication

Source: Compiled by the authors

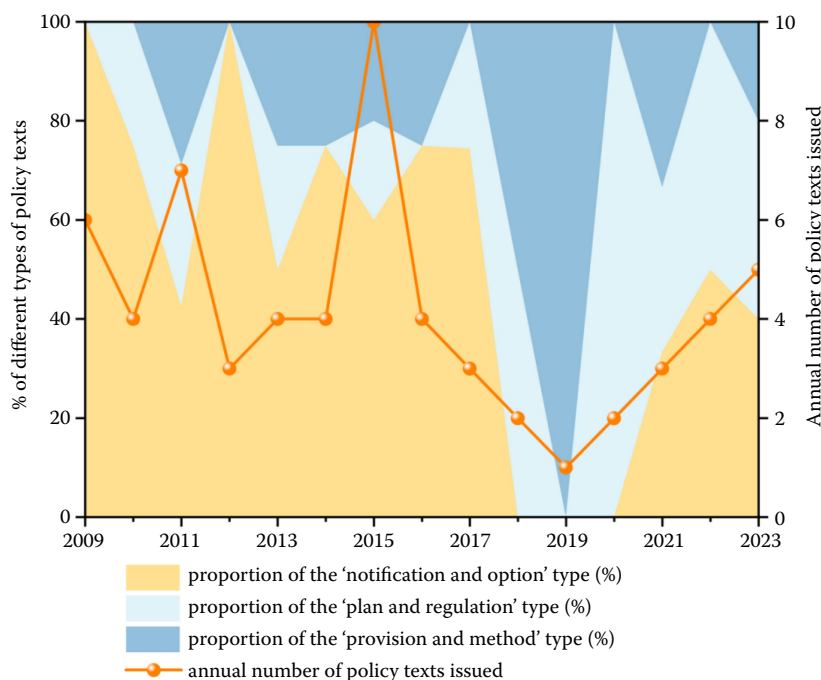


Figure 4. The trend of GI policies and their types

GI – Geographical indication

Source: Compiled by the authors based on an original analysis

number of policy tools fall under the environmental-oriented type, with a total of 55 instances. The supply-oriented tools were next, with 49 instances, while the demand-oriented tools were the least numerous, with only 16 instances. Their respective proportions were 46%, 41%, and 13%, indicating that China primarily relies on improving the external environment and expanding resource supply to promote GI protection.

In 2009, GI protection in China was in its early stages, and the government introduced numerous policies with the aim of promoting the development of specialty agriculture and revitalising industries. From 2009 to 2013, policy primarily focused on supporting GI-related industry through demonstration projects, providing tax incentives to GI enterprises, formulating plans for the development goals of GI, implementing strategic measures, and enforcing legal regulations against

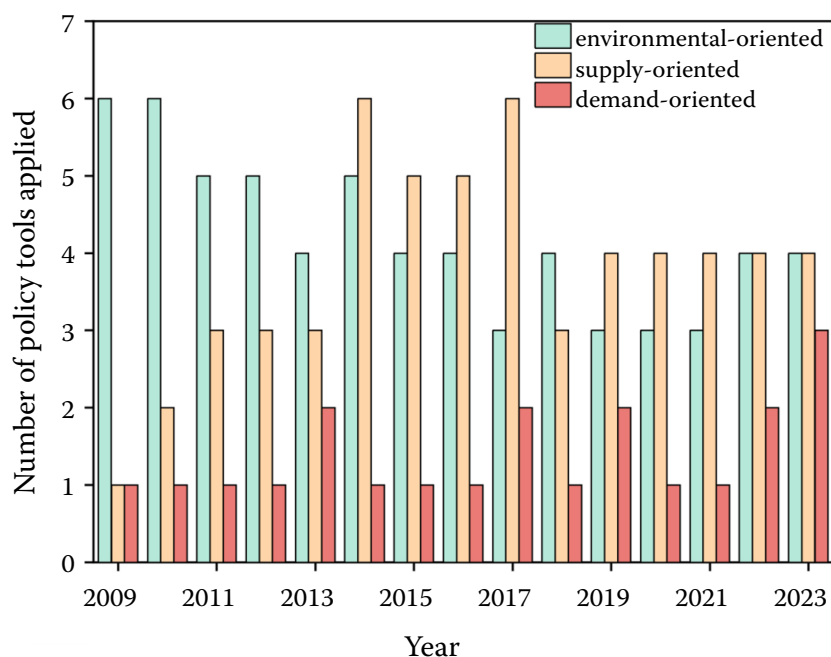


Figure 5. The type distribution of policy tools in the GI protection

GI – Geographical indication

Source: Compiled by the authors based on an original analysis

counterfeit and substandard products. Consequently, supply-oriented policies played a dominant role during this stage.

Since 2014, the development of GI has gradually become more standardised and systematic. The government began to strengthen the implementation of GI protection, primarily by introducing mid-term plans (3–5 years). These plans mainly focused on supply-oriented policies, such as financial support, talent cultivation, and technical support. Compared to the previous stage, the number of policy documents issued in the first stage was higher than in the second stage. However, the second stage saw a greater number of policy tools utilised, indicating that the efforts to protect GI were enhanced during this stage.

In March 2018, as part of the government's institutional reform, the functions of the former State Administration for Industry and Commerce and the former General Administration of Quality Supervision, Inspection, and Quarantine were merged. This reform aimed to strengthen the protection of GI. In response to this reform, the government adjusted their supply-oriented tools, emphasizing a GI protection strategy centred on technological innovation. This approach led to substantial breakthroughs in addressing technological limitations, resulting in improvements in areas such as big data, internet information, and technical support. These advancements provided critical support for enhancing GI protection and contributed to the resurgence of supply-oriented tools during this stage.

Throughout the entire process, demand-oriented tools consistently exhibited the lowest proportion among the three types of policy tools. However, their proportion showed a slow increase after 2018. This indicated that GI products expanded in overseas markets, and the efforts to protect GI products achieved certain results.

In summary, the GI protection policies are developed in conjunction with the national policy guidance and the economic development objectives of the region. While these policies encompass environmental-oriented, supply-oriented, and demand-oriented tools, there is a noticeable shift in the types of policy tools used, transitioning from primarily environmental-oriented tools to an increased emphasis on supply-oriented and demand-oriented tools. These latter tools have become the main driving force behind GI protection.

Cross-analysis in X and Y dimensions

To offer a more visual representation of the evolutionary process of policy tools in GI protection, this study utilised a Sankey diagram to present the evolution pathways of the policy tools. The Sankey diagram is a dynamic flowchart that showcases changes in text data based on a timeline, ensuring that the total width of branches at the starting and ending points remains equal (Lupton and Allwood 2017). The X-axis of the graph represents the time periods of policy tool evolution. The first column represents the environmental-oriented, supply-oriented, and demand-oriented policy tool types. The second column indicates specific

policy measures corresponding to each type of policy tool. The third, fourth, and fifth columns depict the evolution of key terms associated with policy measures during different time periods. The size of each element block, representing a key term, indicates the extent to which new policy content evolved from that term in the subsequent stages; a larger element block indicates a higher amount of policy content generated in the next stages. To capture the updates and changes in policy tools, if the same key term appeared in multiple time periods, only its first occurrence was retained.

The evolutionary path of supply-oriented tools. Figure 6 presents the specific distribution of supply-oriented tools in different time periods. During the period from 2009 to 2013, the development of GI was in its initial stage, marked by strategic planning and infrastructure construction. Consequently, the government employed supply-oriented tools such as equipment introduction, technical R&D, and financial investment to implement preliminary protection measures for GIs. From 2014 to 2017, the government proactively sought to boost market demand, leading to a gradual shift in policy tools from supply-oriented to environmental-oriented and demand-oriented. Keywords related to scientific and technological talents, experts, and research institutes played crucial roles in talent

development. Simultaneously, prominent terms like information network and quality control system saw an increased frequency. From 2018 to 2023, GI protection became closely integrated with the goals of rural revitalisation and industrial development. GI protection has emerged as a significant driving force for the development of the agricultural economy. To foster the development of industries related to GIs, the government has gradually implemented measures to reward GI applications.

The evolutionary path of demand-oriented tools.

Figure 7 presents the evolutionary process of demand-oriented tools in the development of GI protection. Before 2013, the government realised the significant potential for GI development and advocated expanding international markets by guiding the development of relevant industries. As a result, the content of demand-oriented tools continuously increased and became more specific under policy promotion. Key terms during this period mainly included cross-border cooperation, overseas trade, speciality industries, and advantageous industries. After 2013, the government made further adjustments to the relevant protection measures based on local realities. It gradually reduced the policy measures promoting overseas exports and instead prioritised enhancing domestic market de-

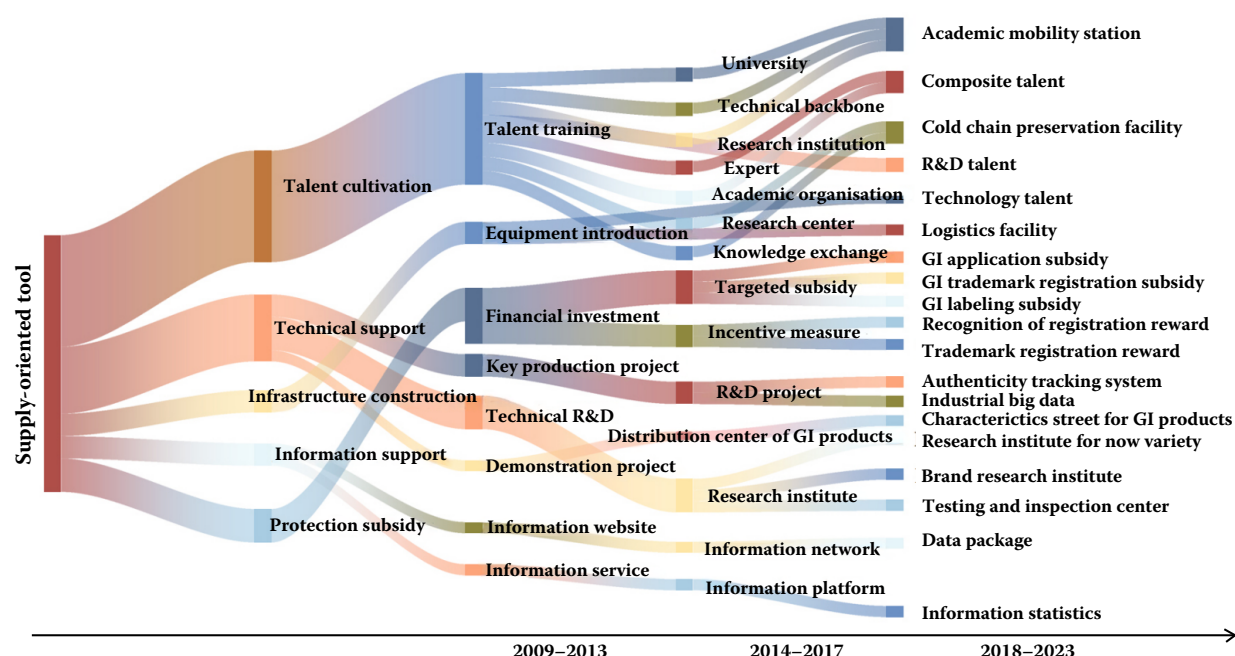


Figure 6. The specific distribution of the evolution of supply-oriented tools

GI – Geographical analysis

Source: Data compiled by the authors based on an original analysis

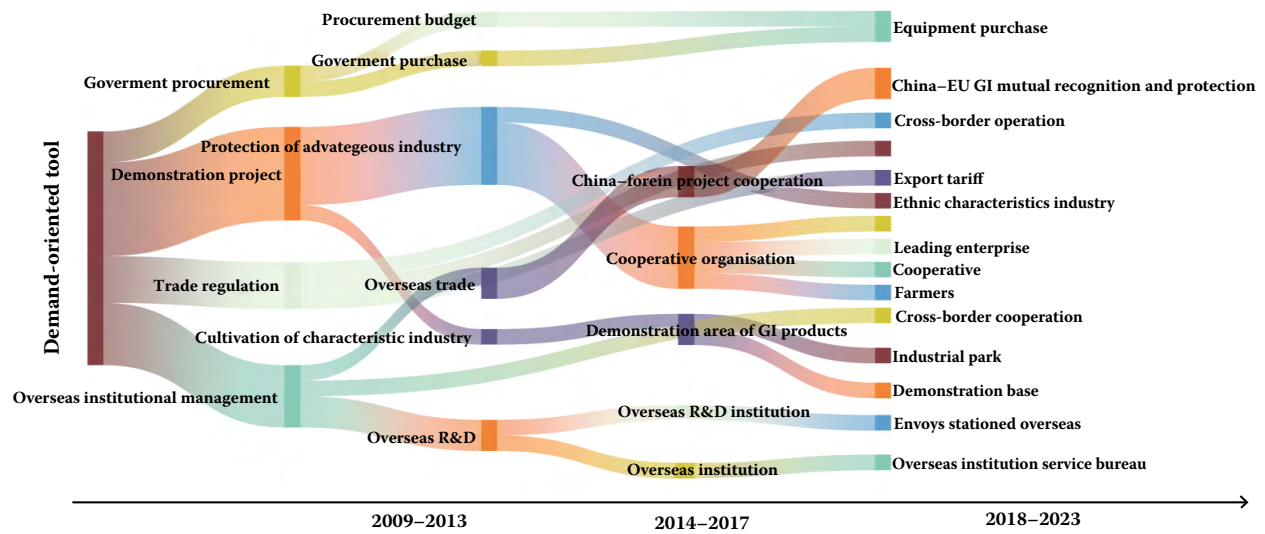


Figure 7. The specific distribution of the evolution of demand-oriented tools

GI – Geographical indication

Source: Data compiled by the authors based on an original analysis

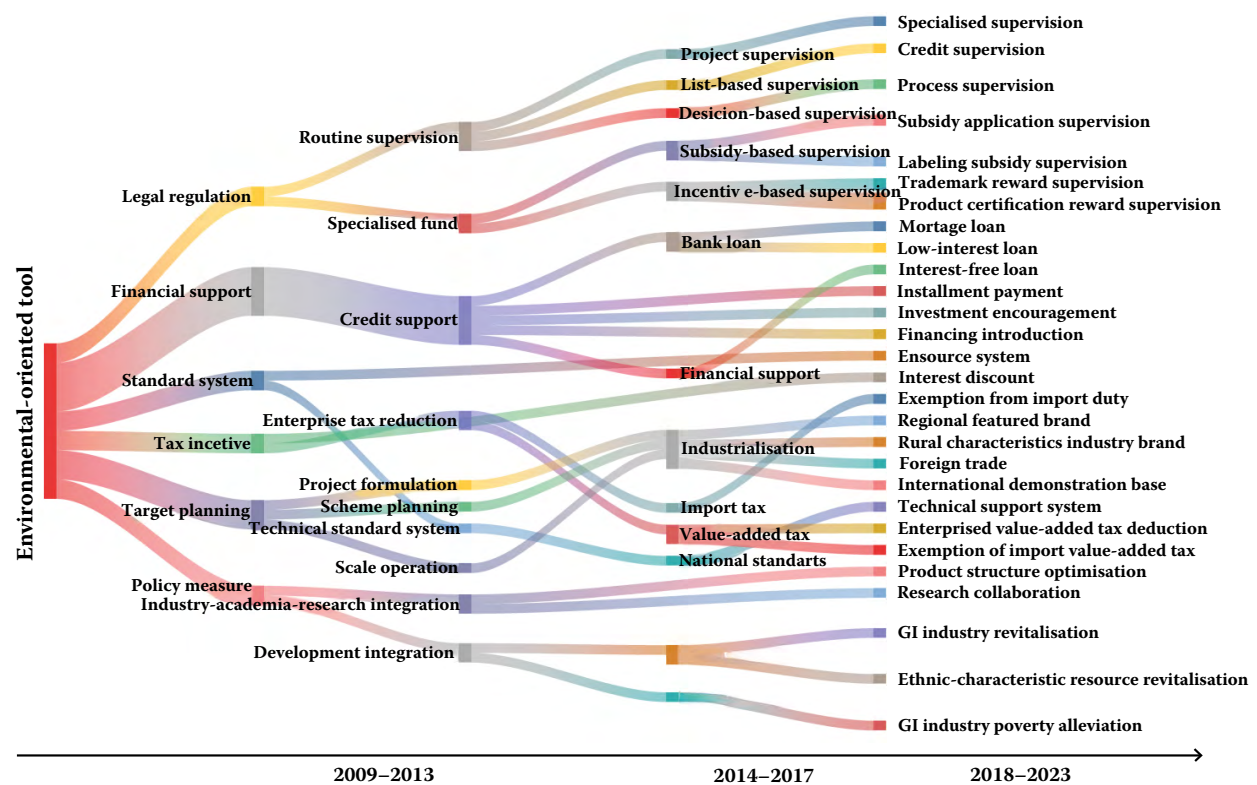


Figure 8. The specific distribution of the evolution of environmental-oriented tools

GI – Geographical indication

Source: Data compiled by the authors based on an original analysis

mand. Consequently, the GI protection policy focused on speciality industries, cooperative organisations, and industrial parks as essential means to develop the GI market. The 'government + leading enterprises + cooperatives + farmers' mode became a key driver for reviving industries and promoting agricultural economic development.

The evolutionary path of environmental-oriented tools. Figure 8 presents the specific distribution of environmental-oriented tools in different time periods. During the period of 2009–2013, the government primarily guided and facilitated the protection and development of GIs through policy initiatives. This involved developing protection plans, formulating strategies for development, and completing applications and protection work for GI products based on relevant technical standards. After 2013, the categories of GI protection became more diverse. The government emphasised the strengthening of policies related to demonstration, supervision, credit support, sales, and taxation for enterprises. Consequently, the scope of protection for traditional advantageous industries gradually expanded. GI protection has effectively increased the added value of speciality products, leading to the emergence of prosperity-inducing and distinctive industries, which has enabled precise poverty alleviation for impoverished farmers. Since 2018, the establishment of national protection demonstration zones or demonstration bases for GI has become a crucial measure for implementing comprehensive industry-chain protection. The government is committed to a strategy of strengthening leading enterprises, creating renowned brands, and supporting farmers, integrating the development of demonstration bases with agricultural restructuring and supply-side structural reforms. This approach has been continuously driving the growth of specialised industries.

DISCUSSION

This study delves into the evolutionary path of policy instruments employed by the Chinese government in the process of GI protection. It is found that the evolution of supply-oriented policy instruments in GI protection exhibits a notable shift from macro to micro levels and from foundational to detailed aspects. This finding holds significant importance for understanding the role of government policies in promoting the development of the GI industry. In the early stages, the government primarily adopted macro-level policy measures, such as talent training, information platform

construction, and the introduction of technical equipment, aiming to provide essential infrastructure and talent support for GI protection. These foundational measures not only laid a solid foundation for subsequent GI protection efforts but also reflected the government's comprehensive planning and layout for GI protection work in the initial phase. This aligns with the viewpoint emphasised by Gao et al. (2023) regarding the fundamental role of government policies in industrial development.

As time progressed, supply-oriented policy instruments gradually increased in number and became more detailed, particularly with the significant enhancement of talent cultivation measures. This evolution indicates that the government has deeply recognised the core role of talent in GI protection and thus increased investment in talent cultivation. This is consistent with the current knowledge-based economy era, where talent is regarded as a core element driving innovative development (Yang et al. 2022). Furthermore, the evolution and distribution of various supply-oriented instruments exhibit a certain degree of correlation. For instance, inadequate infrastructure construction can constrain the acquisition of technical resources. The government's active investment in funds and talent cultivation serves as an important strategy to improve infrastructure construction and enhance technical support. This synergistic effect of policy instruments further demonstrates the government's systematic and forward-thinking approach in GI protection work, echoing the conclusions of Falasco et al. (2024) on the promotion of environmental sustainability through GIs.

Environmental policy instruments have played a crucial role in the process of GI protection. In the initial stages, the government primarily promoted GI protection by formulating project plans, establishing technical standard systems, and strengthening routine oversight. These measures not only provided policy guarantees for the application and protection of GI products but also laid the foundational framework for the development of the GI industry. The formulation of project plans clarified the direction and goals of GI protection, the establishment of technical standard systems ensured the quality and uniqueness of GI products, and the strengthening of routine oversight effectively prevented the misuse and confusion of GI products. This finding aligns with the research conclusions of De Filippis et al. (2022) on the impact of GIs on international trade.

As GI protection continues to deepen, the application of government policy instruments has exhibited

a trend towards greater diversification and refinement. The government has gradually strengthened policies in areas such as demonstration leadership, regulatory enforcement, credit support, and market promotion. The implementation of demonstration leadership policies has encouraged more regions and enterprises to actively participate in GI protection. The enhancement of regulatory enforcement policies has effectively combated infringements on GI products. Credit support policies have provided financial guarantees for the development of the GI industry. The implementation of market promotion policies has increased the reputation and popularity of GI products, facilitating their marketisation process. The synergistic effect of these policies has promoted the standardised development and market application of the GI industry, further enhancing the competitiveness and influence of GI products (Joose et al. 2021). Particularly in recent years, the government has taken proactive steps to establish national demonstration zones and bases dedicated to GI protection. These efforts closely integrate GI protection measures with agricultural structural adjustment and supply-side structural reform. This initiative showcases the government's innovative thinking and practical exploration in the realm of GI protection. Moreover, it effectively fosters the optimisation and upgrading of the agricultural industrial structure, while advancing supply-side structural reform in agriculture. By constructing these demonstration zones and bases, the government has seamlessly integrated GI protection with the development of the agricultural industry. This integration has created a virtuous cycle where both elements promote and enhance each other (Curzi and Huysmans 2022). Furthermore, this innovative model not only offers new avenues for GI protection but also infuses the sustainable development of the agricultural industry with fresh vitality and momentum.

The evolutionary path of demand-driven policy instruments primarily revolves around two directions: encouraging exports and expanding domestic demand. In the initial stage, recognising the immense international market potential of GI products, the government adopted measures such as export credits, export tax exemptions and reductions, and enhanced international marketing to tap into global markets. These efforts aimed to boost the competitiveness and market share of GI products in the international arena, aligning with the findings of Zhou et al. (2023) on the role of government policies in promoting the internationalisation

of agricultural products. However, given China's vast territory and uneven economic development, promoting GI products in the international market faces numerous challenges, including inconsistent product quality standards, low brand recognition, and international trade barriers. In response to these challenges, the government gradually shifted its focus to enhancing domestic market demand in subsequent policy adjustments. This shift reflects the government's in-depth consideration and timely adjustment of development strategies for the GI industry.

To foster the domestic market for GI products, the government has strengthened the cultivation of characteristic industries, the establishment of cooperative organisations, and the development of industrial parks. Cultivating characteristic industries helps enhance the quality and uniqueness of GI products, meeting domestic consumers' demand for high-quality agricultural products. The establishment of cooperative organisations aids in integrating industrial resources, improving the organisational level and marketisation of GI products. Meanwhile, the development of industrial parks provides a platform and carrier for the clustered development of the GI industry, facilitating the extension and expansion of the industry chain. The implementation of these policies has not only driven the sustained development of the agricultural economy but also elevated the domestic popularity and reputation of GI products (Mamba and Ali 2022).

In summary, the evolution of policy instruments in the process of protecting GIs in China exhibits distinct phases and interconnections. Over time, supply-oriented, environment-oriented, and demand-driven policy instruments have continuously been optimised and refined based on key policy measures, demonstrating the flexibility and adaptability of government policies. Simultaneously, a mutually reinforcing relationship has formed between policy instruments and the development of GIs. Policy instruments provide robust policy guarantees and support for GI protection, propelling the rapid development of the GI industry. In turn, the advancement of the GI industry offers a practical foundation and empirical insights for the optimisation and improvement of policy instruments.

CONCLUSION

This study is dedicated to exploring the development of GI protection policy and its governance effectiveness in China from the policy tool level to form a map of pol-

icy tools developed by the government to promote the development of GIs. Based on the analysis, the following conclusions and recommendations were drawn.

Research conclusions

As the means and methods adopted by the governmental agency to realise the policy goals, the policy tools closely associate the policy goals with the results and play the role of bridge. On the one hand, the use of policy tools to strengthen the protection of GIs can effectively guarantee the quality of GI products while helping to promote the standardised production of regional speciality products. On the other hand, the rational implementation of policy tools not only improves the brand value and market competitiveness of GI products but also promotes the development of regional economics.

The application of the three types of policy tools shows a synergistic effect. The utilisation of policy tools has evolved in the following manner: it started with a predominance of environmental-oriented tools, followed by a balanced coexistence of environmental-oriented and supply-oriented tools, and a steady increase in the application of demand-oriented tools. The Chinese government aims to integrate these three types of policy tools, harnessing their collective strength to promote both the protection and development of GIs.

The policy tools employed in the GI protection of China demonstrate a high level of flexibility, allowing for continuous adjustments based on the specific protection needs. During the early stages of GI development, the policies primarily focused on utilising environmental-oriented tools to provide talent, resources, and necessary conditions for safeguarding GIs. As the conditions and market matured, the emphasis on environmental-oriented tools reduced, and there was a notable increase in market-driven supply-oriented and demand-oriented policy tools. As the overall development of GI reached a relatively stable stage, the use of demand-oriented tools was once again increased to propel GI protection to new heights.

Based on the analysis and conclusions drawn from the examination of policy tools in the GI protection, the following recommendations are proposed.

To enhance the utilisation of demand-oriented tools. Currently, the consumer market for GI products is primarily domestic. Therefore, the government should continue to fortify and expand domestic market demand. On the one hand, it should intensify the use of government procurement tools by establishing and improving relevant regulations and policy frameworks

for the procurement of GI products, clearly defining specific requirements such as procurement scope, standards, and procedures. On the other hand, the government and enterprises should collaborate. They should leverage market shaping and overseas institutional management strategies, including establishing overseas marketing networks and engaging in international cooperation, to boost the recognition and competitiveness of GI products in the international market.

Well-balanced supply-oriented tools. Analysis of policy texts revealed that the government employs a significant number of talent cultivation tools, demonstrating a preference for policies such as regular training sessions to accelerate the development of GI products. This effort focuses on nurturing professionals related to the protection of GI products and is making considerable strides in this area. However, it is important to note that the tools of talent cultivation and technical support complement each other. The government has utilised technical support tools to a lesser extent, and there has been a lack of effective technical support to enhance the guiding role of talent. This finding provides valuable insights for other regions involved in GI development. Scientifically allocating the frequency of the tools of talent cultivation and technical support while emphasising the crucial role of technical support is essential.

Standardisation of environmental-oriented tools. Analysing the policy texts revealed an imbalance in the utilisation proportions of different environmental-oriented tools. Particularly, there is a prevalent and repetitive use of target planning tools, indicating a lack of rigour in the government's application of these tools. To address this, the government should focus on standardizing the content and reducing conflicts in the utilisation of target planning tools. By gaining a comprehensive understanding of the fundamental aspects of the protection of GI products, the government could propose more authoritative, instructive, and practical measures of target planning.

Particularly, there is a prevalent and repetitive use of target planning tools, indicating a lack of rigour in the government's application of these tools and a failure to truly address the protection needs of GI products.

Research prospects

From the results of the visualisation and analysis, the framework constructed in this study is committed to solving the black box problem in developing GIs and comprehensively clarifies what has been done at the local level regarding protection policy and how well it has been done. It should be noted that

this study remains limited and needs to be improved by more in-depth investigations. Firstly, this study quantitatively analysed 62 GI policy texts currently in force. However, it lacks a time-dynamic analysis of the overall local government GI policy system and a longitudinal comparative analysis with the central government's relevant policies. Therefore, it is difficult for us to accurately grasp the trend changes in all policies' focus and development direction. Secondly, there needs to be more research on the degree of policy coordination and the coupling between policy content and policy goals at the central-local level. This issue needs to be further addressed in future research, which can better support the systematic development of China's GI policy.

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