



Research on the Optimization of Domestic Waste Classification Policy: An Analysis Based on the Institutional Grammar Tool

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Abstract. Governments at all levels have gradually begun to focus on domestic waste classification as an effective waste management strategy. Nevertheless, there are still many obstacles to overcome in order to apply the current domestic waste classification policies, which leads to less-than-ideal policy results. In order to identify the institutional components and problems in the domestic waste classification policy texts from eight cities in Sichuan Province, this research uses the institutional grammar tool to methodically code and analyse the policy documents. The results show that normative statements make up the majority of the policies of the local governments, with strategic and rule-based statements serving as a supplement. The analysis identifies shortcomings such a lack of incentive systems, insufficient accountability mechanisms, and insufficient behavioural limitations on autotrophs. In order to increase the efficacy and sustainability of policy implementation, this study makes recommendations for policy optimization that include improving rule-based statements, balancing the roles of various stakeholders, and increasing incentive systems.

Keywords: domestic waste classification policy, institutional grammar, policy optimization

1 Introduction

Global environmental concerns have always been of great importance. The "Implementation Plan for Domestic Waste Classification System," which was released in March 2017 by China's National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development, stipulates the classification of waste according to the principles of reduction, resource utilization, and harmlessness. Although domestic waste classification laws have garnered significant attention since their inception, their execution is intricate, and public acceptance and support are not uniform, leading to their limited efficacy to date.

China currently lacks a proper legal and regulatory framework for its domestic waste classification rules. Development should focus on the source, emphasizing policy optimization to lay the institutional and theoretical foundation for the sustainable

development of domestic waste management^[1]. Previous research has examined how household waste classification regulations are implemented and what factors influence them, with the goal of seeking solutions that would support the establishment of new policies. Nevertheless, not many research works have looked at policy documents from a text mining standpoint. In order to better understand this process, this paper will first use the institutional grammar tool to decode and analyse the policy texts of eight local cities in Sichuan Province. From there, it will identify institutional grammar elements and offer optimization recommendations based on policy analysis.

2 Policy Optimization and Institutional Grammar

2.1 Policy Optimization

The process of improving the design, execution, and evaluation of current policies in order to maximize their efficiency, effectiveness, and fairness in order to accomplish the desired policy goals is known as policy optimization. Enhancements to the policy implementation procedure, monitoring, and assessment of policy results are all included in the process of optimizing policy.

The majority of research that has already been done examines case studies, comparative analyses, and qualitative research as means of achieving optimization goals. These studies, however, frequently stop at the macro level and don't provide a thorough examination of particular policy texts.

2.2 Institutional Grammar Tool

Elinor Ostrom and Sue Crawford originally presented the institutional grammar tool in their 1995 publication "A Grammar of Institutions"^[2], explaining how institutions are articulated through the organization and use of language^[3]. The five elements that make up the fundamental rules of institutional grammar, are broken down into institutional statements by institutional analysis. The actors to whom the institutional statement is applicable are referred to as attributes (A). Deontic (D) symbolizes the restrictions on behaviour within institutional language. All descriptions of particular actions and results in the action circumstance are included in Aim (I). Condition (C) specifies the time, place, manner, and degree of the prerequisites for particular behaviours or results. The term "or else" (O) describes the rewards or penalties that actors will encounter if they violate the institutional statement.

Ostrom and Crawford noted that the scientific combination of A, D, I, C, and O elements aids in understanding the institutional distribution in policy texts. Three modalities of expression are found in institutions: Strategy, Norm, and Rule. Rules are ADICO structures made up of every element, they have the highest chance of producing positive feedback results, strong regulatory authority, and high execution effectiveness. Norms are ADIC structures, lacking the or else (O) element, characterized by non-resultant and moderate regulatory features, thus lacking substantial institutional constraints and moderate effectiveness. Strategies are AIC structures, lacking deontic (D) and or else (O) elements, characterized by non-resultant, guiding, and low regulatory

features, with the lowest effectiveness during policy implementation and the lowest likelihood of achieving good execution feedback.

The institutional grammar tool has been frequently used by international scholars for policy text analysis^[4], opening up new avenues for their research. However, less than 10 relevant Chinese publications can be found in the CNKI database, demonstrating a dearth of attention to this area of policy document analysis in domestic research utilizing the Institutional Grammar Tool. Environmental policies are the main subjects of the majority of domestic research that use the Institutional Grammar Tool. These studies show how useful the institutional language tool is for classifying institutional rules and assessing the efficacy of policies.

2.3 Theoretical Application

In summary, previous research has adjusted the meaning and coding norms of institutional grammar to the Chinese setting, offering direction for further domestic scholarly investigation. Overall though, there is still little domestic study done on the institutional grammar tool. Present research solely dissects policy texts and examines institutional norms by use of coding outcomes; it does not delve deeper into policy optimization. This study, which has great academic significance, combines both approaches, using the institutional grammar tool for policy optimization.

3 Case Study

3.1 Policy Text Data Sources

Local government policies are guided by national policies as well as action directions, and local regulations play a significant role in transmitting the institutional value of policy texts. The domestic waste classification policies of the municipal governments in Sichuan Province are adopted in this study. Chengdu, the province capital, is known for its high standards and cutting-edge features in its government policies. Promoting the central city's core function along the axis and leveraging the Chengdu metropolitan area's radiation role to drive the integrated development of the Chengdu Plain Economic Zone is emphasized in the "14th Five-Year Plan and 2035 Vision Outline of Sichuan Province." This list includes Mianyang, Deyang, Leshan, Meishan, Suining, Ziyang, and Ya'an, which are the seven cities that make up the Ring of Chengdu Economic Circle.

Due to the tight linkages that exist between Chengdu and the Ring of Chengdu Economic Circle, this study selected the domestic waste classification regulations of these eight local governments and downloaded the relevant policy documents from the Peking University legal database and the municipal government's website.

3.2 Coding Rules

This study references the coding rules for institutional grammar in the Chinese context, as established by Wang Luozhong in his analysis of the “plastic restriction order” policy^[5]. The coding rules are further adjusted based on the features of legal normative documents and the institutional statement techniques of domestic trash categorization regulations.

The policy text should be loosely divided into chapters or paragraphs based on the original titles, subtitles, serial numbers, and paragraphs. It is necessary to handle each of the following three scenarios separately:

(1) Combining a few attributes (A). Different sample rules use different ways to represent the same attribute. For example, “responsible administrator” can alternatively mean “disposal administrator,” “disposal responsible administrator,” “responsible area,” etc. There is no splitting of these sentence patterns during coding and statistics.

(2) The punishments denoted by or else (O) are regarded as a single analytical unit if they align with the texts that come before and after them. For instance, Article 36 of the Suining policy says, “If the disposer does not dispose of domestic garbage in specified collection containers or collection sites and violates the terms of Article 17 of these laws... As a result, Article 17’s clauses and Article 36’s “or else (O)” can be integrated into a single analysis unit.

(3) This research divides deontic in the Chinese setting into three categories: strong regulatory, quasi-regulatory, and weak regulatory. This will aid in the classification and analysis of deontic (D) and prevent disparate expressions of the same attitude tendency. In contrast to weak regulatory deontic, which mostly includes “may” and “can,” strong regulatory deontic comprises “must” and “forbidden.” Regulation language features are common in quasi-regulatory deontic discourse, but institutional constraints fall between strong and weak regulatory, such as “should” and “ought to.”

Then, group every analysis unit. Sort each analytical unit into one of three categories of institutional statements after coding the elements in accordance with the above guidelines.

3.3 Coding Results

This paper codes eight policy texts according to the above coding rules, classifies and counts the institutional statements and the AIC, ADIC, and ADICO syntax structures of the local regulations on domestic waste classification. It also counts the frequency of attributes (A), deontic (D), and or else (O). This aids in determining the expression patterns and structural traits of domestic waste classification regulations adopted by local governments. Since there are no fixed expressions in the aim (I) and condition (C) elements, the diversity and complexity of their expressions make it impossible to count their frequency. Table 1 displays the coding statistics.

First, the syntax structure of local government domestic waste categorization policies consists primarily of normative statements (ADIC), making up 48% of the total. Strategic statements (AIC) make up 29%, and rule-based statements (ADICO) only 23%. The phenomenon of fewer rule-based and more normative statements is a

reflection of local government policies' inadequate accountability mechanisms for domestic waste classification action subjects. Furthermore, the comparatively small number of strategy statements points to a change in local government policy on domestic waste classification from advising regulatory approaches to required regulation and constraint aspects, marking progress in local government legislation.

Secondly, in terms of attributes, the design of domestic waste classification policies involves multiple levels of subjects. According to the attribute frequency statistics, "responsible administrator" and "competent government" appear more frequently, accounting for 46% and 42%, while "autotroph" appears only 12% of the time. The policies make it plain how different levels of "competent government" would cooperate and divide up tasks. Nevertheless, the policies do not sufficiently in addressing "autotrophs" behaviour.

Thirdly, in terms of deontic, the policies typically use quasi-regulatory deontics such as "should" and "ought to" to connect sentences and paragraphs, accounting for 83%. Followed by strong regulatory deontics such as "forbidden," "shall not," and "must," accounting for 13%; and finally, weak regulatory deontics such as "may," accounting for 4%. The prevalence of quasi-regulatory deontics in policy samples suggests that these regulations primarily include responsibility norms and obligations, which is consistent with the preceding conclusion that normative institutional statements account for a greater proportion. Furthermore, a strong regulatory deontic indicates some degree of compulsion in policymaking.

Fourth, there aren't many rewards or penalties for domestic waste classification. Just 8% of rule-based statements contain incentive mechanisms, whereas 92% contain penalize mechanisms. Low motivation levels are specifically caused by the present incentive mechanisms' limitations and incompleteness. Even if punitive measures cover a wide range of situations, depending only on harsh penalties will not address the issue entirely and may even incite resistance and discontent from the public. Moreover, the application of incentives and penalties is mostly focused on trash disposal and recycling, with limited usage in other chapters.

Table 1. Coding statistics of local government policies on domestic waste classification

serial number	Forms of Institutional Statements			Attribute (A)			Deontic (D)			Or else (O)	
	AIC	ADIC	ADICO	Competent Government	Responsible Administrator	Autotroph	Strong	Quasi	Weakly	Incentive	Penalize
1	19	10	2	14	16	1	3	8	0	1	1
2	44	8	3	16	28	11	4	3	1	2	1
3	27	78	42	56	65	26	19	90	5	2	40
4	6	19	22	21	21	5	1	28	3	2	20
5	12	26	7	25	14	6	7	22	0	0	7
6	15	31	6	21	29	2	2	31	1	1	5
7	8	27	18	25	24	4	2	30	1	1	17
8	3	26	6	15	17	3	1	27	0	0	6
(grand) total	134	225	106	193	214	58	39	239	11	9	97

4 Optimization Suggestions

4.1 Strengthening Rule-Based Statements and Improve Accountability Mechanisms

Add explicit provisions about accountability. Increase the amount of rule-based statements in policy texts that explicitly outline the duties and responsibilities of different attributes. Create a framework of accountability. Provide a stringent accountability framework to punish those who don't carry out their duties and guarantee that the policies are followed. Ensuring that all participants follow waste classification regulations through evaluation, and frequent inspections.

4.2 Balance Stakeholder Responsibilities and Strengthen Autotroph Obligations

Balance stakeholder responsibilities. In addition to the requirements of capable governments and accountable administrations, autotrophs should also be given more responsibility for the trash they produce, such as enterprises and manufacturers.

Strengthen the system of expanded producer responsibility. To make autotrophs accountable for product recycling and disposal at the end of their lifecycles. Through regulation or policy advice, autotrophs can be encouraged to take waste classification and recycling difficulties into account during the design, production, and sales of their products.

4.3 Increase Policy Clause Clarity and Flexibility

Incorporate stronger regulatory provisions. Increase the use of strong regulatory deontics in policy texts, such as "forbidden," "shall not," and "must," in an appropriate manner to clearly specify the obligations and prohibited behaviours of different subjects in waste classification. This will improve the clarity and authority of policy enforcement.

Maintain appropriate flexibility. Keep some weak regulatory clauses such as "may" in certain circumstances to allow for flexible policy execution. In specific policy designs, set flexible clauses based on actual situations and needs to offer diversified solutions for different regions and circumstances.

4.4 Enhance Incentive Mechanisms and Optimize Responsibility Mechanisms

Establish comprehensive incentive mechanisms. In order to boost enthusiasm for participation, increase incentive measures such as financial prizes, honorary titles, and point rewards for different subjects taking part in waste classification.

Enhance the systems for accountability. Refine and improve penalties based on current measures to guarantee that they are reasonable and workable, avoiding an over-reliance on severe penalties which may incite public opposition.

5 Conclusion

Using the institutional grammar tool, this study analyses policy texts systematically and structurally to identify flaws in the current policies and offer suggestions for improvement. This not only enhances the theoretical tools for policy optimization but also provides local governments direction in the formulation and application of policies. Nevertheless, the study has certain limitations, including sample selection constraints and challenges in applying the institutional grammar tool to policy analysis. Following research may compare policy texts from additional regions, perform quantitative analysis and field surveys, and confirm and evaluate the actual effects of policy optimization recommendations. Additionally, exploring how to combine the institutional grammar tool with other policy analysis methods can achieve more comprehensive policy evaluation and optimization.

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