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Sustainable Collective Action in High-Rise Gated Communities: Evidence from Shanxi, China Using Ostrom's Design Principles

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Abstract: Gated communities have been the popular form of housing around the world to address social and safety issues over the past decade, including in Chinese cities. However, gated communities, despite being a more efficient system (less congested), have been criticized for their inefficiency to address the tragedy of the urban commons (overexploitation). Therefore, Ostrom's self-organizing system (collective action) has been suggested as a sustainable approach to govern common resources but little empirical research has demonstrated how Ostrom's collective action theory, associated with new institutional economics theory, is applied to the gated communities' commons management. To address the research gap, the study, via a phenomenological case study, proposes a collective action model in which Ostrom's eight design principles coupled with Williamson's transaction cost and opportunism theories are used to improve commons management performance in gated communities. Using stratified purposive sampling, ten gated communities with various characteristics were selected in the Taigu district. In-depth semi-structured interviews were then held with community managers to collect valid data, which were subsequently subjected to content (thematic) analysis. As a result, by understanding and structuring the managers' real experiences into a modified version of Ostrom's eight principles, the study proposed a collective action model with low transaction costs in terms of enforcement in gated communities as well as reduced opportunistic behaviors of commoners. Specifically, the eight principles in the model include well-defined community members' rights, commons management rules aligned with local needs and conditions, rights of residents to modify the commons management rules, monitoring systems overseen by community members, a graduated sanction system for rule violators, low-cost dispute resolution, unchallenged rule-making rights by community members, and a nested-tier management structure. The study findings contribute novel insights to the formulation of institutional strategies toward sustainable housing and building management for urban and community managers.

Keywords: Ostrom's design principles; transaction costs; commons management; thematic analysis; gated community; Taigu; China



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1. Introduction

With the growth of China's urban area, management pressures on urban public resources are mounting. Overcrowding, overexploitation, and the degradation of urban public resources and services are among the primary issues facing the Chinese housing communities; from the resource governance perspective, these are a form of the tragedy of the urban commons [1]. To tackle such problems, urban managers typically enforce government and private ownership to prevent the tragedy of the urban commons from occurring [2]. Urban enclaves are the product of the privatization of urban commons [3]. Gated communities are a manifestation of the urbanization of housing enclaves. Blakely and Synder [4] defined gated communities as consisting of four features, i.e., the functions

of enclosures, security features and barriers, amenities and facilities included, and type of residents. Building on this, Grant and Mittelsteadt [5] identified four additional features: tenure, location, size, and policy context.

The development of gated communities has resulted in the spatial form of cities developing into mosaics of closed, homogeneous spheres [6]. Against the backdrop of global neoliberal policies, uneven development across regions and an increasingly fragmented urban mosaic have become the representative landscapes of global metropolises. Most studies showed that gated communities are a worldwide phenomenon and essential residences for Chinese citizens [7–9]. The morphological development of urban enclaves as a result of efforts to manage the tragedy of the urban commons has been positively regarded by some scholars [10]. Even so, mainstream voices both in China and abroad have criticized the negative externalities of residential segregation and social exclusion generated by gated communities [4,11–13]. As such, this debate indicates that gated communities offer limited solutions to address the tragedy of the urban commons, as many of the issues about the tragedy of the commons are removed from urban public open spaces and secured within the confines of gated communities, thus creating a two-tiered society of the haves and the have-nots [14].

There are two types of property in gated communities: homeowners' private property and common property. Gated community management generally refers to common property management. Due to the nature of common property rights, common property management in gated communities is carried out by homeowners' or residents' collective actions. Such management strategies have been evaluated positively by some scholars; for instance, Foster [15] suggests that gated communities, as a kind of common-property regime, reflect a "social governance revolution". Ostrom [16] argues that collective action is a sustainable development approach that can overcome the panacea trap and resolve the tragedy of the commons. Common property is typically associated with the supply of "club goods", that is, the right of common property use in gated communities excludes people outside the community and residents are not competitive in their use of the common property. However, taking gated communities in China as an example, some gated communities have limited access and control over common property, such that they cannot completely avoid all negative external impacts [17]. Moreover, most gated communities in China are high-density communities consisting of high-rise residential buildings [13]. The common resources in high-density communities may not meet the needs of all residents; even if residents' needs are met in the early stage, with the development of society, the original supply of common resources may struggle to match the evolving needs of residents. Therefore, in practice, common property in gated communities is more like common pool resources, i.e., low exclusivity and high competitiveness. As such, the failure of common property management in gated communities is similar to the tragedy of the urban commons, which is the result of actors' free-riding behavior. Although this issue has also been examined by past studies [1,3], no studies have proposed a systematic solution to the tragedy of the commons in China's gated communities, such as the development of a commons management model.

When exploring the effective management of commons, through the analysis of extensive successful or failed commons management cases, Ostrom [16] found that long-standing common pool resources have high similarity in the self-organization management system and articulated eight principles for managing commons. Although Ostrom's successful management experience is widely used in conventional commons management (e.g., forestry, fisheries, and wildlife), it has rarely been used as the core theory in the relevant studies on multi-owned housing and gated communities [1,18,19]; less frequently still has it been modified and applied in conjunction with other theories. In addition, few scholars have studied the management of the common in gated communities from the perspective of new institutional economics. Given the above theoretical gaps in the studies of commons management in gated communities, the study aims to address two pertinent questions: (i) how Ostrom's eight principles are applied to common resources in gated communities;

and (ii) whether the commons management issues in gated communities can be solved through a systematic commons management model. Based on a phenomenological case study approach, this research collected and identified the problems in the management of the common in gated communities and the management experiences of managers by conducting semi-structured interviews with 10 gated community managers in Shanxi Province. The interview data were then analyzed using thematic analysis to propose the collective action model of gated community commons management based on Ostrom's eight principles for managing a common. Specifically, the study developed a gated community commons management model with Ostrom's eight principles as the core theory, and in the process of analysis, taking Williamson's transaction costs [20] as secondary theory, the study expounded and proved how the measures consistent with Ostrom's collective action theory help commons management in gated communities. It is hoped that doing so will help to alleviate and address the tragedy of the urban commons in gated communities through institutional designs.

2. Theoretical Framework

The present study adopts Ostrom's eight principles for managing a commons as the core theoretical framework and improves upon it by integrating the classic theory of new institutional economics, i.e., Williamson's transaction cost.

"Governing the commons" theory [16] provides a scientific framework for the management of common pool resources. This theory refutes the methods used by scholars and managers to resolve the tragedy of the commons in the past. Ostrom [16] argued that the use of government and private ownership in resolving the tragedy of the commons falls into "the panacea trap". Her rationale here is that there is no direct and specific connection between types of property rights regimes and successful resource management, and each property system has its weaknesses and limitations; the panacea of commons management becomes untenable when government control decreases or private investment is insufficient.

To effectively manage commons, by studying a large amount of commons management cases, Ostrom et al. [2] demonstrated that self-organizing management is an effective solution that goes beyond government, private, or community control (panacea trap). She found that long-standing commons are highly similar in the autonomy system, even if the contexts of these resources are different. On this basis, she articulated the eight principles for managing a commons (DPs) or key success factors of commons management. These principles, used to ensure the efficacy and success of management measures, apply to both conventional commons and new urban commons [21].

Ostrom's DPs emphasize the governance aspect, rather than the physical/resource and social aspects, encompassing trust, size of the group, leadership, moral sense, and dependence on resources for one's livelihood. Considering the incompleteness, simplicity, flexibility, and generalizability of this aspect, Ostrom's DPs need to be modified and reformulated in light of the given research context as necessary [22]. Adapting Ostrom's DPs is vital in addressing more complex and detailed components of resource management, for example, questions dealing with what potentially relevant factors need to be considered for each principle and how to interpret and apply the principle in practice.

Whilst primarily adhering to Ostrom's original DPs and Williamson's [23] principle on low transaction costs and perverse incentives with a low possibility of opportunistic behavior, the present study also adopts the method articulated by Quinn et al. [24] and incorporates it to achieve institutional analysis and improvement. The improved Ostrom's DPs enhance the effectiveness and success of the self-organization system [25].

The concept of transaction costs was first proposed by Coase [26] and used in economic analysis. Later, Williamson [20] followed in Coase's footsteps by concretizing the concept of transaction costs based on Coase's research. Williamson [27] suggested that all transactions are carried out within the context of a certain contractual relationship, and any contracting problem can be explained by transaction cost. He explained transaction costs from three

aspects: human factors, factors related to specific transactions, and transaction market environmental factors [27].

2.1. Human Factors

Williamson [27] believed that people in real economic situations are not the “economic man” envisioned by classical economics; rather, they are the “contractual man”. The “contractual man” construct refers to actors who, to reduce the risk of opportunism, under the condition of bounded rationality, ensure and implement the execution of the contract, to minimize the transaction cost.

1. **Bounded rationality:** Bounded rationality refers to the behavioral characteristics that stem from pursuing rationality subjectively. However, from an objective perspective, this can only be carried out in a limited way. In other words, generally speaking, although an individual’s motivation to undertake economic activities is purposeful and rational, it is only a rational behavior under limited conditions. Before the transaction, the traders cannot fully collect the information relevant to the prior contract arrangement, nor can they predict various possible changes in the future. Therefore, the contractual man should bear some risks when executing the transaction.
2. **Opportunism:** Opportunism refers to how an individual will seek to further their interests through improper means while pursuing the maximization of personal interests in the transaction process, to the detriment of other individuals’ interests.

2.2. Factors Related to Specific Transactions

Williamson [27] believed that transactions have a specific way of proceeding, for which there must be economically reasonable rationales. Therefore, it is necessary to find out what differentiates various transactions from each other.

1. **Asset specificity:** Williamson explained that asset specificity is “the extent to which assets can be used for different purposes and different users without sacrificing production value. It is related to sunk costs” [28]. When one or both of the transaction parties have invested in special assets, the continuity of the contractual relationship is of great significance. If the transaction is terminated in advance, it will cause a significant loss in terms of the net value of the assets of one or both parties.
2. **Transaction uncertainty:** Koopmans [29] divides uncertainty into two categories. The first is primary uncertainty, which is caused by natural disordered behavior and unpredictable changes in consumer preferences. The second is secondary uncertainty, which stems from the lack of information communication when a person makes a decision. When the transaction is affected by uncertainty, individuals will choose those contractual arrangements that incur the lowest transaction cost possible. Transaction uncertainty is inseparable from bounded rationality; if there is no bounded rationality, there will be no uncertainty.
3. **Frequency of exchange:** Frequency of exchange refers to the number of transactions. To be precise, it only impacts the relative costs of various transactions, not the absolute terms of transaction costs. The establishment and operation of a governance structure incur costs, and the extent to which these costs can be offset by the benefits depends on the frequency of transactions within the specific governance structure. Transactions that occur more frequently are easier to offset against the cost of the governance structure than transactions that occur less frequently.

2.3. Transaction Market Environmental Factors

1. The transaction market environment refers to the number of potential counterparties. Williamson noted that there is a large number of suppliers who can participate in the bidding conditions at the beginning of the transaction. Even so, this does not mean that such conditions will exist in the future. When a transaction monopoly forms, the possibility of the monopolistic party engaging in opportunistic behavior increases significantly.

According to the research background, Table 1 summarizes the content of Ostrom's eight principles for managing commons and their relevance to transaction costs and commons management in gated communities.

Table 1. Ostrom's Governing the Commons Principles and their relevance to transaction costs and analyzing common property management in gated communities.

Ostrom's Principles	Relevance to Transaction Costs	Relevance to Common Property Management
1st: Defining clear group boundaries.	Gated communities with clear group boundaries have lower transaction costs related to commons management. As per transaction uncertainty, clearly defined commons management rights can build trust among residents, meaning that individuals are less inclined to engage in opportunistic behavior (i.e., seeking to reduce the costs they incur as much as possible).	Individual residents have the right to use the commons in gated communities and community boundaries must be clearly defined. Who has the right to govern commons in gated communities? What rights should they have?
2nd: Matching rules governing the use of common goods with local needs and conditions.	Rules matching residents' needs and conditions can reduce the disparity amongst residents' benefits in collective action, thereby reducing the divergence of residents and reducing the commons management costs.	Appropriation rules restricting time, place, and technology are related to local conditions. In other words, appropriate collective action rules should be designed taking account of the community context. Moreover, the costs and benefits of commons management and use rules must be proportionate.
3rd: Ensuring that those affected by the rules can participate in modifying the rules.	According to bounded rationality, commons management rules were initially developed under limited conditions. Therefore, the commons management rules in gated communities can be modified at any time according to the specific conditions of gated communities. If the commons management rules cannot be modified in time, there would be certain risks to the individual community members participating in commons management, resulting in higher transaction costs. Monitoring the behavior of community members can reduce opportunistic behavior and transaction uncertainty. Monitoring the managers of commons management can prevent managers from monopolizing commons management and partaking in opportunistic behavior.	Residents affected by the collective action rules can participate in modifying and devising the rules.
4th: Developing a system, carried out by community members, for monitoring members' behavior.	The graduated sanctions system is conducive to reducing collective action costs. On the one hand, sanctions can reduce the uncertainty of commons management and the opportunistic behavior of free-riders. On the other hand, a graduated sanction system can build trust among community members, reduce the uncertainty of commons management, and thus reduce commons management costs.	Effective monitoring of the managers' resource management and maintenance behavior of commons management. The resource condition is monitored by residents or property owners in the gated community.
5th: Using graduated sanctions for rule violators.		Residents who violate commons management rules will be sanctioned by other residents. The intensity of sanctions depends on the seriousness and context of the offense of the violators, although the sanction should not initially be severe.
6th: Providing accessible, low-cost means for dispute resolution.	Low-cost dispute resolution is a commons management method that incurs low transaction costs.	Property owners, residents, and relevant officials have rapid access to low-cost local arenas in which they can resolve conflicts among residents or between residents and officials.

Table 1. Cont.

Ostrom's Principles	Relevance to Transaction Costs	Relevance to Common Property Management
7th: Making sure the rule-making rights of community members are respected by outside authorities.	The impact of stronger external forces on commons management will incur higher transaction costs. When external forces intervene in commons management, due to the lack of rule constraints for external participants, the possibility of opportunistic behavior stemming from external forces will increase.	The rights of residents or property owners to design commons management rules are not challenged by external forces.
8th: Building responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.	The nested tiers management structure can divide the large-sized commons into small units to reduce the transaction costs relating to commons management.	The collective actions in gated communities are organized in multiple layers of nested enterprises. Especially for large-sized gated communities, multi-center management is required.

3. Materials and Method

3.1. Study Area

As highlighted in the introduction, commons management in high-density gated communities in China is prone to succumbing to the tragedy of the commons. According to Olson's collective action theory, as group size increases and more members are sharing the benefits, community members, as self-interested rational individuals, have a stronger motivation to engage in free-riding, destroying collective interests [30].

It is worth noting that the Chinese housing system was reformed in 1998, which directly affects the current types of gated communities in China. Regarding the concentration of resources to develop national productivity, before China's reform and opening up in 1978, the Chinese government transferred the function of providing social services to workplaces, most of which were state-owned. During this period, 75% of China's citizens lived in gated communities associated with their workplaces. After China's reform and opening up in 1978, the market economy began to affect China's real estate industry, and in 1998, China fully implemented the real estate market economy. As a result, citizens' housing and related daily lives were gradually separated from their workplaces. Based on the policy background detailed above, the existing gated communities in China can be divided into two categories: "post-workplace community" and "new community". The residents' social composition in "post-workplace communities" includes the original staff and foreign residents who purchased real estate from the original staff. Accordingly, the residents' social relationships in "post-workplace communities" include both industrial and geographical relationships. Contrastingly, "new communities" are those communities built after the housing reform and not managed by the workplaces, such that the social relationships among residents are geographical.

The built-up area in Taigu, Shanxi Province, China, was selected as the study area. The built-up area spans around 10.86 square kilometers. According to the statistics from China's seventh census, Taigu's urban area has a population of 162,425. The gated communities in Taigu, much like other regions in China, have been affected by China's housing reforms. As a result, these gated communities can reflect the characteristics of China's gated communities to a certain extent. According to the data from the "Taigu Housing and Urban-Rural Development Bureau", at the end of 2019, there were 300 gated communities in the Taigu urban area, including 138 "post-workplace communities" and 162 "new communities".

In the study area, ten gated communities were selected through stratified purposive sampling. In the sampling process, communities younger than 6 years old and those communities with an occupancy rate of less than 60% were excluded, because the management system and facilities of these communities may have not yet fully matured. Based on the nature of local gated communities, gated communities in Taigu are divided into two categories and five sub-categories. We adopted this classification as the basis for our study,

whilst also considering other factors, such as location, management mode, size, etc., to separately screen out five “post-workplace communities” and “new communities”. The stratified purposive sampling process is shown in Figure 1.

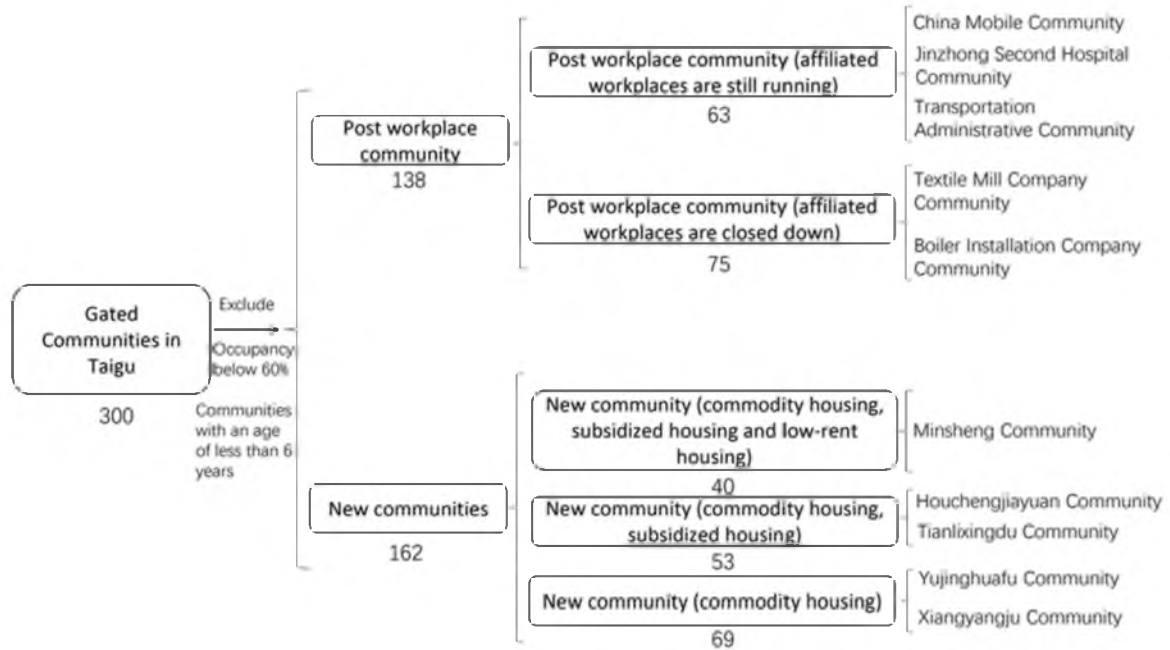


Figure 1. The stratified purposive sampling process of gated communities.

The age range of these ten gated communities is 6–27 years old, and all of the communities are multi-story residential buildings. The location and aerial photos of the gated communities are shown in Figures 2 and 3, respectively.

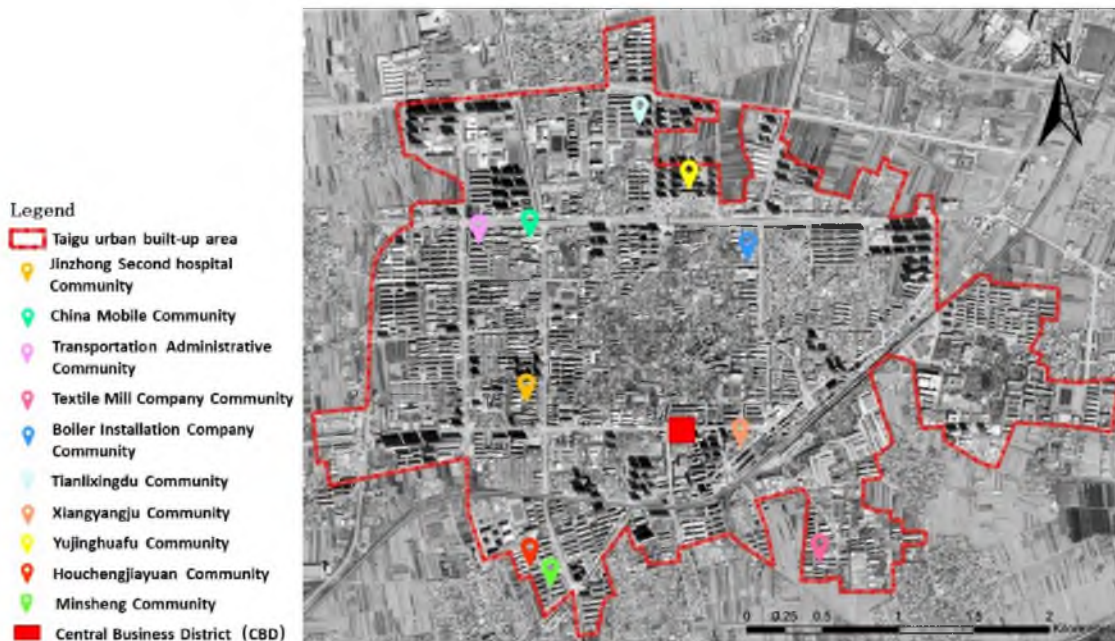


Figure 2. Locations of the ten gated communities in the Taigu urban built-up area.



Figure 3. Aerial photos of the ten gated communities.

3.2. Data Collection

The present study employed a qualitative research design, specifically, a phenomenological case study. The purpose of a phenomenological study is to understand the essence of the human experience to gain a rich understanding of a particular experience from the perspective of the participants [31]. Case studies are anchored in real-life situations to provide a rich, holistic account of a given phenomenon [32]. When a study focuses specifically on the lived experiences of the individual or group under study and the meanings that this individual or group gives to their experiences, the phenomenological approach and case study method can be used in conjunction with each other. This approach enables the researcher to understand or make sense of the intricate human experiences and “the essence and the underlying structure of a phenomenon” [32]. For this study, the phenomenological case study approach is fused with modified Ostrom’s DPs to demonstrate the context-based commons management experiences of managers from 10 gated communities.

Based on the phenomenological case study approach, semi-structured interviews were conducted with managers of ten gated communities to collect the required qualitative research data. Individual interviews are a valuable research method for gaining insights into individual perspectives [33]. Some gated communities are managed by property management companies; as such, the respondents of such gated communities are the leaders of property management companies. These gated communities include the Transportation Administrative Community, Minsheng Community, Houchengjiayuan Community, Tianlixingdu Community, and Yujinghuafu Community. The commons management in some gated communities is wholly dependent on the residents’ self-organizing management. As a result, the respondents of such gated communities are the residents’ leaders of gated communities. These gated communities include the China Mobile Community, Jinzhong Second Hospital Community, Textile Mill Company Community, Boiler Installation Company Community, and Xiangyangju Community. The interview method takes the form of a face-to-face interview conducted in Chinese. The interview time is about 20 minutes per person, and the interview content is organized around open-ended questions. These questions were based on Ostrom’s eight principles for managing commons. The interview instrument is shown in the Appendix.

These interview questions were designed to understand the issues related to the experience of community managers in carrying out commons management in gated communities.

3.3. Data Analysis

Based on Ostrom’s DPs, the data were analyzed using a reflexive thematic analysis to conduct a narrative analysis of the institutional design of community leaders’ implementation of commons management. Reflexive thematic analysis is an easily accessible,

theoretically interpretative approach to qualitative data analysis that facilitates the identification and analysis of patterns or themes in a given data set [34]. It can identify and classify the commons management experiences of ten gated communities' managers through the inductive and deductive methods, which is an analysis approach of the phenomenological case study design. By adopting this method, a six-phase analytical process was used.

Phase one is the "familiarization" phase. In this phase, we read and re-read the interview records, and recorded our thoughts and feelings on the data analysis.

Phase two is the "generating initial codes" phase. In this phase, we systematically studied the whole data set and generated brief codes by applying the principle of according equal attention to each data item. As shown in Table 2, eight data code sets are generated according to the interview questions.

Table 2. Generation of initial codes.

	Codes
1	Different community members in community management (government, residents, property management agents), homeowners' association defining rights of community members
2	Equal costs and benefits, fairly distributing commons, unfair commons distribution causing disputes
3	Modification of commons management rules through homeowners' convention, avoiding the monopoly of managers, solving commons management problems in time
4	Mutual supervision between managers and residents, equal rights of community members, monitoring managers' behavior through homeowners' association
5	Initial severe sanctions intensifying conflicts, graduated sanction rules building trust, handling ordinary violations within the community, handling tough violations through government and legal departments
6	Low-cost dispute resolution rules, disputes are caused by free-riding, government, and legal departments involved in conflict solution
7	Homeowners' association protecting residents' rights, legal aid for infringed residents' rights
8	Hierarchical management through the election of building heads or unit heads

Phase three is the "generating themes" phase. In this phase, we analyzed the relationships amongst different codes and studied how this relationship informs the narrative of a given theme, to generate clear themes related to the research questions. As the core theory of this study is the modified Ostrom's DPs, the generation of themes was guided by a deductive approach (theory-driven approach) and supplemented by an inductive approach. The generation of themes is shown in Table 3.

Phase four is the "reviewing potential themes" phase. This phase requires researchers to recursively review candidate themes related to coded data items and the entire data set. This process reviewed and further revised potential themes to ensure that they form a coherent pattern that contributes to the overall narrative of the data, and provide the most apt interpretation of the data related to the research questions.

Phase five is the "defining and naming theme" phase. In this phase, we extracted some key data items and defined the themes by elaborating on the description of the research participants or analyzing the description of the participants in combination with the relevant context. The defined themes are shown in Figure 4.

Table 3. The generation of themes.

Codes	Sub-Themes	Themes
Different community members in community management (government, residents, property management agents), homeowners’ association defining rights of community members	Different members in a gated community, the role of homeowners’ association	Defining clear group boundaries
Equal costs and benefits, fairly distributing commons, unfair commons distribution causing disputes	Equal costs and benefits, prevention and resolution of conflicts	Matching rules governing the use of common goods with local needs and conditions
Modification of commons management rules through homeowners’ convention, avoiding the monopoly of managers, solving commons management problems in time	Role of homeowners’ association, monopoly of managers	Ensuring that those affected by the rules can participate in modifying the rules
Mutual supervision between managers and residents, equal rights of community members, monitoring managers’ behavior through homeowners association	Role of homeowners’ association, equal rights, and community members, prevention and resolution of conflicts	Developing a system, carried out by community members, for monitoring members’ behavior
Initial severe sanctions intensifying conflicts, graduated sanction rules building trust, handling ordinary violations within the community, handling tough violations through government and legal departments	Prevention and resolution of conflicts, the role of government and legal department	Using graduated sanctions for rule violators
Low-cost dispute resolution rules, disputes are caused by free-riding, government, and legal departments involved in conflict solution	Prevention and resolution of conflicts, the role of government and legal department	Providing accessible, low-cost means for dispute resolution
Homeowners’ association protecting residents’ rights, legal aid for infringed residents’ rights	Role of homeowners’ association, the role of government, and legal department	Making sure the rule-making rights of community members are respected by outside authorities
Hierarchical management through the election of building heads or unit heads		Building responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system

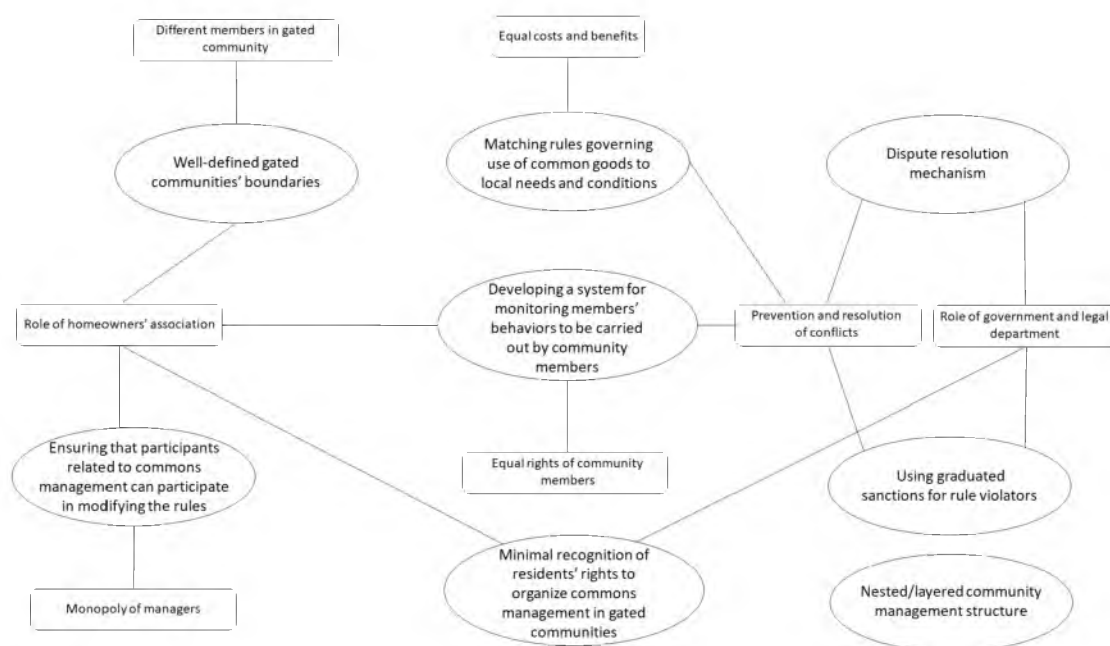


Figure 4. Thematic map.

The sixth phase is the “producing the report” phase. In this part, we discussed the defined eight themes based on the improved Ostrom’s eight DPs. The results of this part are reported in the “Results and Discussion” section.

4. Results and Discussion

The study was designed to demonstrate the commons management model with Ostrom’s eight principles for managing a commons as the core theory and analyze commons management experience in China’s gated communities by conducting interviews with community managers. From this, it aimed to put forward recommendations for commons management in China’s gated communities combined with the modified Ostrom’s DPs. Through the six-phase analytical process applied to the interview data, the thematic analysis produced eight themes.

These eight themes are closely related to Ostrom’s DPs, meaning they can reflect the successful commons’ management experience of managers in gated communities. Although none of the surveyed communities fully meet Ostrom’s DPs, each principle has practical experiences that can be referenced within the ten communities. These experiences can be used to guide the development of the collective action model to carry out commons management in Taigu’s gated communities.

4.1. Well-Defined Gated Communities’ Boundaries

The managers of the ten communities believed that clear community boundaries, who has the right to govern commons, and what rights should they have are important for commons management in gated communities. Due to the property rights of gated communities, legal gated communities have clear physical boundaries, with the managers of gated communities paying more attention to the boundaries of commons management participants’ rights.

A manager in the Textile Mill Company Community said:

“It is very important to define the rights of participants of commons management in gated communities. If there are no well-defined rights for commons management participants, some residents and managers would harm the common interests for their interests; for example, residents privately occupy the public green space in a community to grow vegetables”.

An effective means to define communities’ boundaries is to form a homeowners’ association, notably in gated communities with mixed low-cost housing, in which common property is partially owned by the government.

The manager of the Minsheng Community said:

“There is some public welfare low-cost housing in our community. Therefore, the property rights of commons in the community are not completely owned by residents, but this does not entail those residents living in low-cost housing would not participate in commons management in communities and fail to follow commons management rules. To make every member of the community bear the responsibility of commons management and abide by the community commons management rules, we registered the homeowners’ association, formulated the commons management rules, and defined the rights and obligations of different participants. It is unrealistic to rely on a single group to manage the commons in our type of community”.

Regarding the spatial boundary definition of gated communities in Taigu, this term pertains to a tangible and immovable property where its usage, location, size, and shape attributes are predetermined during the land sub-division. For commons management in gated communities, it is crucial to define the rights of community members: defined rights of commons users and managers can reduce transaction costs. Based on the transaction uncertainty concept, clearly defined members’ rights can reduce perceived uncertainty among members. When community members make decisions, the collective action participants will choose to adopt the same arrangement to reduce the organizational cost of collective

action and the management cost of correcting individual behavior. Long-term collective action can build trust and reciprocity among residents, improve cooperation ability, and reduce the transaction costs associated with commons management.

Therefore, gated communities should make relevant rules to define the rights of community members. The establishment of a homeowners' association is an effective scheme, as homeowners' associations are organizations that formulate and implement commons management rules. Moreover, it can define the rights of community members for commons management in gated communities and is protected by law. Especially for those gated communities with mixed low-cost housing, the property rights attached to part of the commons and housing in communities belong to the local government. Notably, exclusively relying on government management makes it difficult to achieve high-quality commons management performance. At the same time, low-income residents cannot afford commons management models that require high capital investment, and successful collective action on the part of residents can reduce the investment pressure of community commons management. Moreover, as gated communities with mixed commodity housing and low-cost housing contain residents from different social classes, there is a greater need for residents to rely on clearly defined members' rights to build trust.

According to the legal provisions of the homeowners' association establishment, when the occupancy rate of a community exceeds 50% or two years from the date of the first owner's occupancy, the community is allowed to establish a homeowners' association. The homeowners' association is the most powerful legal means to define the rights of participants regarding commons management in gated communities. For new gated communities, in particular, the management of their common was initially managed by the developer and the property management companies designated by the developer. To delineate the rights boundaries of different participants, the owners must assume their commons management rights through legal means.

Firstly, among the residents, through voting or other mechanisms, the preparatory committee (made up of the property management administrative department, the property management companies, and the owners' representatives) will schedule an election within a pre-determined period. The preparatory committee will also supervise the election process. Through the democratic election of residents, the community selects the neighborhood association committees that are responsible for setting the collective rules (e.g., secretary, president, treasurer, etc.).

Next, the community submits applications to register the establishment of an owners' association, the members of the owners' association, and the constitution of the owners' association. The contents of the three filing documents include the boundary of the community, commons management rules, relevant legal provisions, a list of members of the owners' association, and details of the election process of the owners' association.

Once the owners' association is registered, the local government and developers will transfer the responsibility for commons management to the unit owners within the association via a legal memorandum. This then allows the homeowners' association to manage the commons in the gated community with the local authority, property management companies, and developers. Management entails a range of activities, including but not limited to the enforcement of rules governing members, as well as enclosing the gated community, monitoring the use of commons in the gated community, and charging fees.

4.2. Matching Rules Governing the Use of Common Goods to Local Needs and Conditions

The managers in the ten gated communities highlighted the importance of residents using common property fairly, as the unfair distribution of common property among residents is prone to conflicts. Some gated communities charge for the upkeep of common spaces to achieve the equal distribution of common property to residents.

The manager in Houchengjiayuan shared his opinions:

"It is very important to ensure that residents' costs and benefits are equal, the management of our community had been troubled by this issue. In the past, our community installed

a public hot water supply system. After five years of operation, the residents of our community thought that the maintenance cost of the public hot water supply system was high, and they preferred to install private water heaters. Finally, we dismantled the public hot water supply system. Moreover, in the past, the right of using public basketball courts in our community often led to conflicts among residents. Some residents thought they had the priority to use the basketball courts because they play basketball on the courts. However, other residents that although they do not play basketball, they invested in the maintenance of basketball courts, they had the right to do what they wanted on the basketball courts. Finally, we revised the rules of the right to use basketball courts, residents must pay additional fees to use the basketball courts”.

Most of the residents in the Textile Mill Company Community are laid-off employees, but there are many common properties left in the community, such as the workers’ cultural center. Following the closure of the textile mill, the common property lacked stable capital maintenance from the company, leading the managers of the community to change their management strategies.

The manager in the Textile Mill Company Community said:

“After the closure of the Textile Mill Company Community, some common properties in the community were preserved, such as the workers’ cultural center and cinema. We lost our jobs and lacked a stable source of income. Therefore, we charge the users of the workers’ cultural center and open it to the public. On the one hand, this strategy can protect the common heritage and avoid disrepair, and part of the profits can also be used to maintain other common property in the community”.

The use of the common property must ensure that all users enjoy fair and equal access. Within gated communities, to equitably collect the cost of common property maintenance and management, it is necessary to evaluate the cost and benefit of each user. Unfair collective action rules will cause higher transaction costs. Suppose particular users have often used and benefitted from the common property. In that case, their fees should be higher because inequality and unfair rules incentivizing individuals in collective rule compliance may cause the collective action system to collapse [22].

In addition, the investment ability of residents requires evaluation so that the frequency of common investment in common property management can be appropriately increased according to residents’ economic circumstances. For example, the frequency of payment of common property management fees can be changed from annually to monthly to stimulate residents’ enthusiasm for common property management by enhancing residents’ perceived benefits. Some gated communities lack the necessary expandable space to meet the living needs of some residents, whilst others have sufficient common facilities and spaces, but their utilization rate is low, entailing higher maintenance costs. Therefore, some gated communities can consider realizing the commercialization of common facilities and spaces, such as basketball courts, by charging consumption fees. On the one hand, common property commercialization can reduce the common investment cost of gated communities; on the other hand, it can meet the needs of residents from other communities.

4.3. Ensuring That Participants Related to Commons Management Can Participate in Modifying the Rules

It is not uncommon for property management companies to monopolize the common property management in gated communities. Inevitably, such actions damage the interests of residents. The main reason for this is that the owners are not familiar with common property management affairs or they are not highly engaged in common property management. In the surveyed communities, very few residents in the communities participated in the supervision of managers.

The manager in the Minsheng Community described a case in which the owners of the Minsheng Community independently selected community managers through collective action. He said:

“In the past, the neglect of the manager for community hygiene caused the owners’ dissatisfaction with the community hygiene. More and more residents expressed their dissatisfaction with community hygiene to property management companies. After that, we organized a decision-making meeting. Finally, more than half of the owners expressed dissatisfaction with community hygiene. Then we hired new cleaners, and up to now, there are no more complaints from the owners about community hygiene”.

The regular holding of house-owner conventions can allow for the discovery of commons management problems in communities and the adjustment of the commons management rules promptly.

The Jinzhong Second Hospital Community relies on the employer associated with the community to hold house-owner conventions. The manager of the Jinzhong Second Hospital Community said:

“Our community holds regular house-owner conventions to ask our employees if there are any problems in community life, and we will take some improvement measures in response to these problems. We believed that this is beneficial to common property management in gated communities”.

Gated communities should elect a homeowners’ association to represent the interests of residents. Such an association has the right to modify the rules for commons management and the process and results of rule modification are protected by law. When allowed to devise their own sanctioning rules, those who adopt their own rules tend to follow these rules closely and achieve higher joint returns. As a result, the use of punishments almost ceases [35]. According to bounded rationality, when gated communities initially formulated rules, residents could not anticipate all of the issues that would arise about common property management and the changes in the attributes of the common property. Therefore, the homeowners’ association must hold regular meetings to modify the rules of commons management in gated communities to adapt to the changes in the environment of gated communities as and when needed. When the management of the common rules is not aligned with the community environment, this will likely give rise to management blind spots, resulting in higher transaction costs.

Moreover, for those gated communities managed by property management companies, homeowners’ associations should regularly evaluate the performance of the property management company and managers. Based on this evaluation, they can then decide whether to replace the property management company based on the evaluation results. The homeowners’ selection of property management agents is also one aspect of participating in the formulation and modification of rules. If there is no regular evaluation, the property management company and managers will monopolize the common property management in gated communities. When such a monopoly forms, the property management company and managers are more likely to neglect their responsibilities, thus leading to a decline in management performance. Therefore, homeowners and residents in gated communities should actively participate in the formulation and modifiability of commons management rules in gated communities through the vehicle of the homeowners’ association, otherwise, the lag in management rules and the monopoly of property management agents will result in higher transaction costs for commons management in gated communities.

4.4. Developing a System for Monitoring Members’ Behaviors to Be Carried Out by Community Members

Under the constraints of common property management rules, residents will monitor managers’ and other residents’ behaviors, especially when their interests are, or are likely to be, violated. Residents may be keen to ensure that managers in communities use commons cautiously and thoughtfully, rather than opportunistically overusing the commonly held resources. Residents will also be willing to monitor the management work of managers, whether or not they are carrying out their work promptly.

The manager of the Yujinghuafu Community said:

“It is important to monitor the behaviors of community members. Commons management in gated communities is not only the behaviors of residents being monitored by managers, but also residents’ monitor of managers’ behaviors is equally important. Because residents and owners are the main participants and beneficiaries of commons management in gated communities, poor commons management performance would cause a greater loss to residents than other participants. When either party has more power than the other, the party with more power will infringe on the interests of the party with less power to seek more interests”.

The residents in the Xiangyangju Community established a homeowners’ association and hired security guards and cleaners to be responsible for the security and hygiene of the community. To safeguard their interests, the residents regularly use the homeowners’ association as a platform to monitor and evaluate the managers’ behaviors and management performance.

The manager in the Xiangyangju Community said:

“Every resident in our community is a participant and supervisor in the common property management. When residents find that the managers have the behaviors of evading management responsibilities, residents will report to the homeowners’ association. The homeowners’ association will sanction the managers who failed to fulfill management obligations”.

Commons management in gated communities without the inclusion of an effective monitoring system will give rise to higher transaction costs. As determined by the transaction costs, community environments that lack effective monitoring measures will induce individual “free-riding” behavior (opportunistic behavior), which will precipitate the loss of others’ benefits and collective interests. As a guarantee for collective action, an efficient and robust monitoring system can greatly reduce the costs of commons management. The common environment monitoring in gated communities is not only responsible for monitoring community managers, but also all residents in gated communities. As owners of common property rights, even without coercion or external incentives imposed on residents, they may still voluntarily monitor other users’ behaviors and common property consumption [22].

For supervisor organizations, the homeowners’ association shall propose mutual supervision strategies to ensure that managers abide by their management responsibilities. When the residents find that some managers exhibit speculative behaviors in their responsibilities, they can report to the homeowners’ association, which will administer a corresponding punishment based on the commons management rules in gated communities.

4.5. Using Graduated Sanctions for Rule Violators

Ten managers in the surveyed communities agreed that the initial severe sanctions are challenging to implement, regarding such measures as unacceptable.

The manager in the Lijinghuating Community said:

“It is important to use graduated sanctions for rule violators, the initial severe sanction is difficult to implement. According to our experience, the severe sanction is difficult to solve the issues, and it would intensify the conflicts among residents, and even leads to conflicts between residents and community managers. Initial severe sanction is not conducive to the harmonious relationship among commons management participants in gated communities”.

The manager in the Minsheng Community said:

“The progressive sanction rules can enable residents to continuously learn and accumulate management experience in the process of common property management in gated communities, build a sense of mutual trust among residents and improve their collective action ability. The initial strict rules will cause the disgust of some residents, whether they intentionally or unintentionally violate the rules of common property management. When a resident illegally parks for the first time, we will warn about illegal parking”.

behaviors by posting a warning strip. When residents park illegally many times, we will impose fines on violators. If violators still do not correct their wrong behaviors, we will seek the help of the sub-district office. For more serious violators, we will seek the corresponding law-enforcing departments or take other legitimate legal means to sanction the violator's behaviors".

Negative externalities should be internalized by imposing substantial penalties on violators (i.e., free-riders, evaders, or excessive users). The lack of effective sanctions will increase the transaction costs flowing from commons management in gated communities. Due to the lack of constraints enforced by the sanction system, members of gated communities will bear higher risks when undertaking collective action. When members take risks in the process of commons management, they will choose different contract arrangements, specifically by selecting those that incur the lowest costs. When implementing penalties, it is necessary to ensure that the sanctions are fair, impartial, and persuasive. Therefore, a graduated sanctions system should be designed and implemented to evaluate violations and the corresponding penalties. Ostrom [36] believed that sanctions should be graduated, as opposed to being severe from the outset. Graduated sanctions can build trust among collective action participants, as people can learn to value trust and reciprocity and regard them as the fundamental norms around which they organize their lives. Most violations should be resolved by the homeowners' association. When there is a dispute over punishment, the neighborhood office can intervene, coordinate, and provide assistance, such as holding advisory meetings on the suitability and methods of sanctions and providing legal advice and assistance to help settle serious or difficult disputes. Based on the above, those users who violate the rules for the first time should be given a lighter punishment.

4.6. Dispute Resolution Mechanism

Conflicts and disputes among residents are not conducive to collective action. Such conflict usually arises from violations by individual users against the interests of others. Therefore, the most effective way to solve and redress this conflict is for managers to identify violations and sanction violators swiftly and effectively. The managers of the ten gated communities expressed their preference for accessible and transparent rules.

The manager in the Jinzhong Second Hospital Community emphasized the importance of accessible and low-cost rules to the solution of conflicts:

"Accessible, low-cost dispute resolution rules are important. On the one hand, such rules can make our work easier. On the other hand, inaccessible dispute resolution rules often cause more disputes".

The manager in the Houchengjiayuan Community said:

"Most of the conflicts among residents in communities are resolved through intercession or sanction. The most difficult problems to resolve in the community are conflicts caused by violations that are vaguely defined by common property management rules. It is difficult for us to decide on this kind of conflict; because if we do not have enough persuasion to solve these conflicts, some residents will question our professionalism, avoid the rules and make some violations that are not conducive to the common interest. When we have problems that are difficult to deal with by existing rules, we usually seek the help of the sub-district office, which is more experience in resolving disputes in gated communities. They have more resources and ways to help solve community disputes".

The management of gated communities should take self-organizing management as its touchstone, supplemented by government departments. According to bounded rationality, the rules of commons management in gated communities cannot involve all issues and solutions of commons management. Compared with residents in gated communities, government departments are more capable of dealing with civil issues. As stated in the fifth principle, government authorities and departments are better equipped in terms of resources and experience to solve more difficult common property management issues in gated communities. The government appropriately intervenes in the common affairs of

gated communities to promote common property management. Ostrom [36] argued that changing rules that exclusively use unanimous ideas may give rise to high transaction costs. Thus, appropriate external governmental intervention is necessary.

4.7. Minimal Recognition of Residents' Rights to Organize Commons Management in Gated Communities

The managers of the ten communities agreed that the sanction rules effectively monitored and corrected any violations made by residents. In particular, they ensured that the rules were not interfered with by external forces. When the rules are interfered with by external forces, support from some higher-level external forces may induce violations in the community.

The manager of the Minsheng Community expressed his view as follows:

"It is important to protect the rights of residents from being interfered with by external forces. Part of the common properties in our community belong to the government, but the main users of these common properties are residents living in low-cost housing. If there is no homeowners' association to safeguard the rights of these low-income residents, we cannot guarantee that some government managers seek their interests privately through some corrupt behaviors and harm the interests of residents".

The manager of the Boiler Installation Company Community also had a deep understanding of this. He said:

"Part of the land assets in our community belong to the Boiler Installation Company, which has bankrupt at the end of last century. However, the original company leaders want to seek personal interests through external leasing and sales of land assets. Together with the powerful residents in our community, the original company leaders privately occupied part of the common space, which caused negative impacts on our daily lives, such as daily travel and rest. Then, we mobilized all owners to safeguard our rights, and even though legal intervention, after a series of effective actions, our common property management rules can run properly".

The common property management in gated communities should take all necessary steps to minimize the interference of external forces as much as possible. The rationale here is that the interference of external forces may induce "free-riding" behaviors in communities, and weaken the implementation of common property management rules, neither of which is conducive to the stability of commons management system in gated communities and the organization of collective action. If the established management system is broken, the probability of individual opportunistic behavior of commons users will increase, increasing the management costs associated with commons management.

The communities must form homeowners' associations, which can better organize collective actions and unite the power of homeowners to safeguard their interests. More importantly, relying on the platform of a homeowners' association, residents can accumulate knowledge about common property management by engaging in the process of collective action. When external forces interfere with the management of the common in gated communities and infringe upon the interests of residents, residents can use the homeowners' association as a platform to safeguard their interests through legal means, such as seeking help from the sub-district office or higher-level administrative and legal departments.

4.8. Nested/Layered Community Management Structure (Polycentricity)

A large community size frustrates attempts to engage in common property management in gated communities. It is difficult to achieve good common property management performance with the actions of just a single manager or property management company, as this single entity has heavy management pressure to bear.

The Yujinghua Community, Houchengjiayuan Community, and Tianlixingdu Community all implement zoning and hierarchical management of the community. This is achieved by holding spontaneous elections for building heads. As the manager in the Tianlixingdu Community said:

“Our community is large and uneasy to manage. Therefore, with our mobilization, the residents of each building spontaneously elect a resident with rich community management experience and management ability to be elected as the building head. When residents need help, the building head will help them solve the problems or further convey the needs and opinions of residents to the property management company. I believe that it can bond residents’ relationships, and residents can express opinions freely better, and our management pressure will be less”.

With the acceleration of urbanization, the size of gated communities has gradually increased. Among the 10 gated communities studied in this paper, the largest gated community contains 1289 households, which makes common property management a difficult task. Therefore, hierarchical management is necessary. Relying only on a one-center approach, the center would be heavily burdened and undermined as the operational transaction cost is highly positive [37].

To better cope with the management difficulties, some large-sized gated communities have adopted a vertical and horizontal multi-layer management structure in the form of electing building heads. Residents’ collective action in gated communities should be coordinated and organized by the building heads. For certain common property management issues, the building heads shall be the first to coordinate and deal with such issues. If they cannot be handled, they shall be further reported to the homeowners’ association or property management agent for handling.

To summarize, by analyzing the research data, this research found that there are relationships between Ostrom’s DPs in the present study context. In Ostrom’s DPs, “well-defined gated communities’ boundaries” are the prerequisite for “ensuring that participants related to commons management can participate in modifying the rules”, “minimal recognition of residents’ rights to organize commons management in gated communities”, “developing a system, carried out by community members, for monitoring members’ behavior”, and “using graduated sanctions for rule violators”. The reason for this is that the residents’ collective action efforts in gated communities need to protect the rights of residents and homeowners and restrict the rights of other community members through authoritative means. The homeowners’ association, a community organization recognized by law, can serve as a platform for the protection of residents’ rights and homeowners and ensure the implementation of self-organizing management.

“Matching rules governing the use of common goods to local needs and conditions” can prevent disputes from arising, thus indirectly reducing the cost of dispute resolution. “Using graduated sanctions for rule violators” and “developing a system, carried out by community members, for monitoring members’ behavior” are cost-effective measures for carrying out dispute resolution. Specifically, a clear monitoring system can clarify the causes of disputes and determine the responsibilities of relevant individuals, whilst graduated sanctions can provide low-cost dispute resolution solutions.

“Nested/layered community management structure” is not necessary for all gated communities. Such a structure has a small impact on the management of the common in small-sized gated communities, yet it has a significant impact on the commons management of large-sized gated communities.

Based on the above research results, the residents’ collective action model in gated communities is summarized in Figure 5.

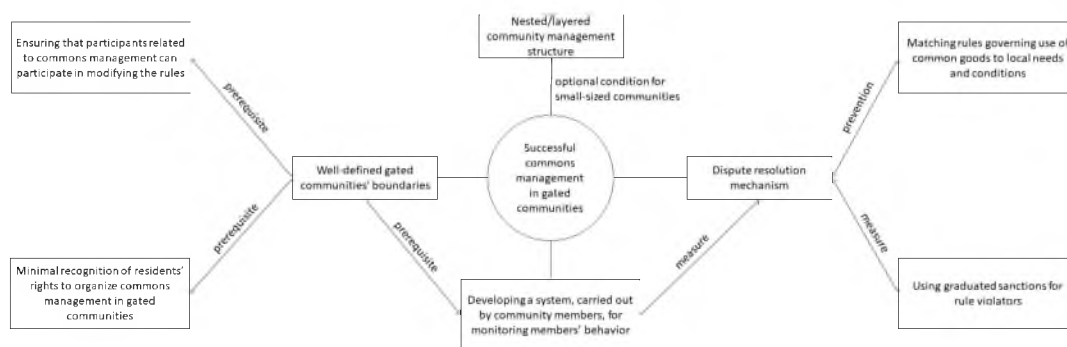


Figure 5. Collective action model in gated communities.

5. Conclusions

Through interviews with managers of gated communities and thematic analysis, we systematically identified the typical issues of commons management that arise in China's gated communities and demonstrated the way to apply Ostrom's eight principles the management of commons in local gated communities. This study proposed a collective action model for commons management in gated communities based on the improved Ostrom's eight principles incorporating Williamson's transaction costs. The present research offers novel insights for scholars and practitioners, namely, using the social–ecological system-based new institutional economics approach to analyze the collective action related to the management of the common in gated communities. This is important, as it bridges the gap between new institutional economics and Ostrom's collective action theory in commons management in local gated communities. Moreover, most of the studies on China's gated communities' management only discussed the social problems in gated communities and the contradictions among community members and did not discuss how to coordinate the relationship among different parties and propose a systematic management model (see Hamama [38]; Breitung [39]; Lu et al. [40]; Lu et al. [41]; Yip [42]). The study addresses this gap, which is the innovative significance in the practice of China's gated communities' management. Thirdly, the study further identified the relationships amongst the principles contained in Ostrom's DPs, which constitutes an empirical contribution to the application of Ostrom's DPs in the context of commons management in gated communities.

Despite the study's unique theoretical and methodological innovations, and its application value for the commons management of gated communities, it is nevertheless subject to certain limitations. The study was not conducted in a wide region, which may lead to the omission of some commons management issues. Moreover, the collective action theory of new institutional economics-based solutions remains to be properly tested and evaluated on the ground.

Therefore, to better understand the de facto acceptance and feasibility level of collective action, this paper suggests that more gated communities and more stakeholders should be considered and assessed in future empirical research, such as local governments, residents, developers, and community managers. Future research is vital to develop more tangible and practical self-organizing management strategies to create a livable, democratic, and sustainable community environment and minimize the negative impacts of social segregation caused by enclave urbanism.

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