Managing municipal waste in China from a standpoint of social governance

Min Zhang, Ying Ma, Mengmei Liu, Huijuan Zhang and Yunsoo Lee

Abstract
The research on municipal waste management is getting some traction from both scholars and practitioners. However, few studies have systematically reviewed this issue in China. Therefore, the purpose of our paper is to respond to this lacuna by systematically reviewing the research on urban waste management in China. In addition, we addressed the difficulties encountered by multiple stakeholders with respect to municipal waste management and provide a coherent understanding from a social governance perspective. Drawing on a systematic literature review, we analyzed 40 papers on social governance of waste management. The synthesis of previous studies demonstrates that although government deserves credit for guiding other actors, it cannot effectively safeguard the interests of all stakeholders. We integrated previous findings and gleaned suggestions for governments to implement strategic waste management.

Keywords
Municipal waste management, social governance, systematic literature review

Introduction
With the rapid development of urbanization in China, the amount of urban garbage has been sharply rising (Mian et al., 2017). According to the statistics of the Ministry of Ecology and Environment in 2018, the annual output of urban waste in China has exceeded 200 million tons and it is increasing at a rate of 8% to 10% every year. Constructing ecological civilization is not only critical to the well-being of urban citizens, but also a vital part of building a livable community. As a result, greater attention has been paid to municipal waste management.

The Chinese government has been wrestling with the challenges of classification standards, classified collection devices, and garbage removal. In 2000, the Ministry of Housing and Urban-Rural Development issued the “Notice on Announcement of the Pilot Cities for Separating Domestic Garbage Collection,” which proposed the eight pilot cities for garbage sorting for the first time: Beijing, Guangzhou, Guilin, Hangzhou, Nanjing, Shanghai, Shenzhen, and Xiamen. However, the first batch of pilot cities had not generated substantial effects. Thus, the State Council issued the “Household Garbage Classification Management System” policy in 2015. In order to form garbage management based on the rule of law, 46 cities have initiated the preliminary work of garbage classification and achieved noticeable results. However, they also faced various problems in practice.

In recent years, academia has carried out research on the problems in the process of urban waste management. Nonetheless, there are only a handful of studies that comprehensively assessed waste management in China. Mian et al. (2017) presented the case of China through an illuminating analysis of waste management. Ding et al. (2021) offered a rich and useful set of tools with which China handled waste. Zhu et al. (2021) made several valuable contributions to the study of waste management by reviewing overall garbage situation. However, scholars have little systematic understanding of waste management in China from the perspective of social governance.

Managing municipal waste requires a clear understanding of the relationship between diverse stakeholders. The
academic literature on social governance has blossomed in recent years with the growth in interest of challenges of managing municipal waste. While a number of scholarly works have instigated this issue, only limited attention has been focused upon this issue, incorporating social governance. There is a strong need to systematically integrate the body of research that either quantitatively or qualitatively assessed waste management in China. The chief objective of our study is to conduct a systematic literature review on social governance with regard to municipal waste management in China. Moreover, we attempt to identify the challenges of waste management. In addition, we seek to clarify the relationship among participants in the process of managing municipal waste in China. Drawing on the 40 selected literature studies, we put forward the suggestions for furthering organizational processes of effectively handling municipal waste in China.

Theoretical background

Waste management

Municipal waste comes from wastes of a city collected from households and companies (Nanda & Berruti, 2021). The types of urban garbage exists a great variation, ranging from food waste, commercial waste, construction waste to sanitation waste (Sharholy et al., 2008). Mismanaging garbage creates problems such as public health as well as greenhouse gas emissions and putrid leachate runoff (Nanda & Berruti, 2021; Vergara & Tchobanoglous, 2012, p. 1438).

Waste management refers to “a set of management alternatives, including resource reduction, recycling, reuse, composting, landfill, and incineration garbage classification (Keller, 2000, p. 320).” Broadly speaking, it covers the whole process of classified collection, delivery, transportation, and disposal. The aim of waste management is to “protect human and environment health” (Vergara & Tchobanoglous, 2012, p. 296). It also drives sustainable economic growth (Visvanathan & Trancker, 2003).

Due to the heterogeneous nature of urban garbage, government is usually more suitable for managing overall process (Nanda & Berruti, 2021). Improper infrastructure derails progress of urban management (Sharholy et al., 2008). More important, however, it requires a collective endeavor of multiple actors of society. It demands a systematic project, which is the key link of the government’s comprehensive waste management (Chen, 2019).

Waste classification is a fundamental component of waste management. The classification of garbage refers to the process that people dispose garbage at household according to the classification rules, and then deliver it to the garbage disposal sites by transportation, and eventually turn it into public resources after recycling (Zhou et al., 2019). It plays a large role in waste management because waste needs to be sorted out at the source as much as possible to reduce the amount of waste required disposal (Zhu et al., 2021, p. 6620).

Social governance in China

The contemporary public sector entails “a high level of complexity, partly due to the presence of multi-level governance settings where several kinds of organization are in charge of different phases of the public policy and service cycle (Sicilia et al., 2016, p. 22).” Unlike traditional public administration, governance calls for inter-institutional coordination (Frederickson, 1997). The term governance covers broader sense of planning, policy-making and management (Ansell & Gash, 2007). The gist of governance lies in the defused authority to various actors (Wu, 2014). In particular, collaborative governance helps to reduce the costs for implementing unpopular policies (Ansell & Gash, 2007).

In China, one of the most distinctive features of governance is its long-standing presence of the communist party. How government works in China hinges on management capability of the Chinese Communist Party to achieve its objectives (Zhao & Peters, 2009). Social governance offers the potential to address unique challenges in China. The Chinese Communist Party replaced social management with social governance for explaining the state-society relationship (Yang et al., 2016). It was initially proposed at the Third Plenary Session of the 18th Central Committee. General Secretary Xi emphasized the traditional social management and linked legal logic to social governance. Governance is aimed to achieve synergy with market and society through the state’s leadership to solve emerging social problems (Dai, 2019). The Fourth Plenary Session of the 18th Central Committee stressed the adherence to legal governance. The Chinese Communist Party proposed the plan to refine social governance in order to stimulate the initiative of the whole citizenry to participate in policy implementation process. The report of the 19th National Congress of the Communist Party of China articulated the notion that building a social governance pattern of co-construction leads to social prosperity.

Social governance explains the boundary among state, market and the public in China. Guiding, controlling, and regulating foster public interest and at the same time tend to satisfy public’s needs (Yu, 2018). Previous scholar studied the ethical aspects of social governance model, such as governance and rule of law, responsibility, and value in social governance (Zhang, 2014). Social governance lubricates the relationship between citizen, government, and non-governmental organizations (Sun, 2015). Social governance in China is more like hierarchical governance in other countries because government has still a heavy influence.

Social governance was designed for government, market entities, non-profit organizations, and the public to create solutions for common issues. Each stakeholder shares resources, supports, and supervises each other. Participating in the process of providing public goods and services may improve public benefits (Chen, 2019). The purpose of
social governance is to promote due process of law, coordinate various entities to make effective efforts to achieve the common goal. Governance develops managerial competencies to handle urban waste classification. In this study, we incorporate social governance perspective into municipal waste management.

Methodology

Systematic literature review

In this paper, we conducted a systematic literature review. Systematic review is “a review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise research and to collect and analyze data from the studies that are included in the review (Booth et al., 2016, p. 316).” It suits a clearly formulated question that uses rigorous filtering to identify, select, and appraise relevant research (Moher et al., 2009). It helps a researcher to perform a critical appraisal of the literature (Crossan & Apaydin, 2010). As such, it has been widely applied in social science as well.

The advantage of a systematic literature review is that it provides transparent and explicit protocols by which researchers search for and assess the field of studies relevant to a specific research topic (Macpherson & Holt, 2007). Systematic literature review has often been conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach. The checklist items were included to reduce risk of bias and increase the reliability of a review (Liberati et al., 2009).

We followed Voorberg et al. (2015)’s systematic review methods because their structure gives researcher a framework to better understand the topic. Moreover, there is much variation in the methodologies. Booth et al. (2016) categorized systematic literature review into 12 approaches: Narrative synthesis, grounded theory-constant comparison, meta-ethnography, meta-synthesis, meta-study, logical analysis, data analysis techniques, metaphorical analysis, domain analysis, hermeneutical analysis, discourse analysis, and analytic induction. Among those, we took narrative synthesis because previous literature on garbage management applied variegated research approach such as qualitative, quantitative and mix methods.

Study eligibility criteria

We examined the governance effects and existing problems of all selected articles according to the roles of each actor in garbage management. The identified articles must meet certain criteria before they can be included in the study. First, the title or abstract of a paper should contain waste management and social governance. Second, the types of literatures must be an academic paper or a dissertation. Third, the research content must include the participation of multiple stakeholders in the garbage management process. Fourth, the cited frequency should be high, at least cited more than 10 times.

Report eligibility criteria

Our review was confined to the literature that had been published from January 2005 to December 2020. We chose this time span because few Chinese cities implemented policies and regulations related to garbage classification before 2005. In addition, we included studies written in the Chinese or English language.

Search strategy

We searched the following databases for related documents: China National Knowledge Network Database, Wan Fang Data Resource System, VIP Chinese database and Web of Science Database. Chinese and English search keywords “social governance,” “garbage classification,” and “China” were included, respectively.

Record selection

Searching the search results and filtering, this search yielded 157 articles. In addition, 13 additional articles were found to meet the inclusion criteria by checking the bibliography of other resources. We identified and deleted 35 repetitive studies by “title, author, and time.” We exported the remaining 135 retrieved studies to an Excel file. We used keywords to filter, and further examined the retrieved articles by precluding 20 documents irrelevant to the topic. Among those, 15 documents were excluded by the article title. Ten documents were excluded because we could not get the full text. Based on this classification criteria, we made an in-depth analysis of the abstracts and full texts of the remaining 90 articles. Through studying the literature criteria (press releases, comments, and conference briefings), 50 papers were excluded. Finally, after reading all manuscripts, this pool was narrowed down to 40 articles. Figure 1 is a flow chart of selection for inclusion in the study.

Synthesis

In this section, we synthesized the evidence into a comprehensive set of waste management in terms of social governance. Urban garbage management involves various stakeholders such as government, enterprises, and communities. We sought to distill and synthesize the tapestry of social governance that multiple actors have woven. Based on our systematical analysis of our sample papers, we categorized stakeholders as government, people, social enterprises and non-governmental organizations because those
are the key actors in waste management in China. We will explain how each actor faced difficulties with respect to municipal solid waste.

**Government**

Forty six key cities in China have adopted the government-led urban garbage classification mode. A public authority monitors waste classification process with coercive power. This undermines spontaneous participation in trash classification. The previous research shows that the classification of urban garbage in China is changing from voluntary incentive to government-led measures (Qin & Shen, 2020). Under the leading role of the government, grassroots communities maintained the orderly implementation measures of environmental protection policies. Indeed, the effect of garbage classification in different communities reflects the differences of community participation and governance structure (Qin & Shen, 2020; Wang & Zhou, 2016). Stakeholders are motivated to participate in garbage sorting through publicity, education, guidance, encouragement and organizing under the leadership of the government.

The government provides a guide to the public and non-state actors with regard to garbage classification in five ways (Du & Huang, 2019): First, it publicizes waste classification in public places such as streets and communities to create a social atmosphere for waste classifications. Second, it promotes specialization classification managers through the grassroots waste education. Third, it provides on-site guidance to citizens to help them master the specific methods of garbage classification. Fourth, it offers economic returns to the mass who actively participates in garbage sorting. Fifth, it organizes public welfare activities related to garbage sorting and encourages people from all walks of life to participate.

Integrating market and society into the macro system of garbage classification can facilitate the garbage classification work in an orderly manner (Du & Huang, 2019). It is of great significance to change the government’s single-center treatment mode so as to construct collaborative environment and use the information technology to improve the convenience of garbage classification (Feng & Qin, 2019). It is suggested that the government should introduce a charging policy. The charging policy of the government can improve citizens’ garbage classification behavior, which is an effective way to reduce garbage emission and improve the recovery rate of household recyclable resources (Meng et al., 2018).

Despite the importance of government, responsible public behavior is vital for waste management, and the function of government cannot be simply handed over to the market. The government has abundant administrative resources in community governance, and has more advantages in dealing with externalities. As such, government intervention is the crucible for garbage classification (Liu & Li, 2019). To some extent, the Chinese government has authoritarian

---

**Figure 1.** The systematic literature review process (the PRISMA flow diagram).
underpinnings. As for its supervisory role, scholars have studied the influence of policy incentives and supervision on the classification and recycling of municipal garbage. When the government implements negative incentives, it can effectively restrain the behavior of enterprises. However, the excessive supervision cost will lead to administrative burdens of waste management (Wang, Jian et al., 2020).

The public

Public participation is an integral part in the municipal waste management (Nanda & Berruti, 2021). In particular, the demands for civic engagement are intensified with respect to social governance (Yang et al., 2016). Along with the increased awareness and the improvement of participatory ability, substantial achievements have been made in public input with regard to garbage classification. However, citizens seemed to have been much less understanding of policy knowledge and are not versed with participatory skills.

Previous research on citizens and communities participating in garbage classification management focuses on the multitude aspects. First of all, the key to garbage classification management is to realize the source classification, which requires cooperation and public participation. However, most citizens are relatively inexperienced in garbage classification. Although some are aware of sorting out garbage, the public has not translated their recognition of waste classification into actual participation. The formation rate of source classification is low and the awareness and persistence of participating in classification processing are not high (Tan, 2020). This hindered the modernization of social governance to a certain extent. There are many relevant regulations on garbage classification in China. However, there is no mandatory or specific requirement for participating in garbage classification, nor can citizens be guaranteed to participate in rubbish classification (Yu, 2020). This engendered problems in practice.

In addition, the success of garbage management depends largely on citizens’ awareness of voluntary participation. Although the government has carried out some guidance, it has not been established in a short time. To a large extent, communities with managers relied on the supervision of secondary classification to facilitate garbage classification. The result of the areas without supervisors was defective. Low citizens’ voluntary participation hampers the accuracy of classification (Zhuang, 2020). The public tended to passively classify garbage under the external forces, which makes it difficult to implement effective garbage classification policy. As long as garbage is sorted out in places where citizens can’t observe, it had a negative impact. Most citizens lack the knowledge of domestic garbage classification. In addition, the classification standard is too vague to be conducive to operation (Zhao, 2019).

There are fundamental problems in citizens’ cognition of garbage management. Health risk awareness altered people’s behavior, especially environmental protectionism. However, due to citizens’ living habits, preferences and lack of facilities, citizens have not formed a social atmosphere of garbage classification. Many witnessed that citizens’ awareness of garbage classification is weak because they have inadequate time, information, and expertise. Also, public awareness of garbage classification is uneven. Citizens’ garbage classification standards are not accurate, which are important aspects of governance problems in citizens’ garbage classification (Li, 2019).

Moreover, at the level of community governance, problems are embedded in systematic design and mobilization. It is found that there is still a gap to be bridged between the demand and supply of the public. To begin with, in the system design, the classification of urban garbage is mandatory from top to bottom without considering the basic needs of the public safety and interests. Besides, the classification exceedingly stressed the mandatory classification of urban garbage. It is unresponsive to the citizens’ needs and concerns. At the same time, the lack of community leadership led to the weakening of the public capability (Bi, 2020).

Furthermore, a community sought the public input with furnishing a cognitive condition. The individual environmental cognitive dilemma is an important factor that leads to the cacophony between citizens’ willingness of garbage classification. The public may have the willingness to participate in garbage classification. However, the community does not directly consider the public personal characteristics (Ding, 2020). However, communities faced significant impediments in mobilization, such as small mobilization scope, low coverage, meager publicity, and low efficiency, which led to low awareness and low participation rate of the public on garbage classification (Lu & Wang, 2020).

Moreover, improper disposal of classified garbage in community is detrimental to garbage management. The focus of garbage management is on terminal treatment, mixed cleaning and transportation of garbage, classification of source of contusion, imperfect taxes, and fees for garbage treatment (Wang, 2014). Some communities implemented the mixture of garbage cleaning and transportation, which caused the slow progress of community garbage classification. On the other hand, the tax and fee system in the process of garbage disposal in China had deficiencies, which generated governance problems in garbage classification (Xu, 2020).

Social enterprise

Social enterprises are of great importance in the context of garbage classification. Although waste is often considered as a hazard, it is perceived as a commodity with a lucrative market value (Moore, 2012). Municipal solid waste is often renewable and becomes economical resources (Nanda & Berruti, 2021). However, there have been some problems in
the maturity and participation of relevant enterprises in waste management. Many social enterprises suffered from low profitability because the Chinese culture forces social enterprises to provide public service for free (Kerlin et al., 2021). In the process of garbage management, social enterprises are attentive to the role of intermediary of people’s livelihood. Enterprises provide household with waste management system services. They are responsible for the recovery, transportation and final disposal of waste resources.

Our systematic review reveals that there are many ways for enterprises to participate in garbage management. First, they are providers of garbage collection services. Second, enterprises are purveyors of garbage transportation. Third, enterprises are suppliers of terminal garbage treatment services (Ma, 2020). In order to stimulate the source control of enterprises, it was suggested to drive the support for subsidies and technology research (Tan, 2020). Garbage classification industry is not lucrative. In order to make profits, enterprises need to establish close cooperation with the government, underpin the public efforts of garbage classification and recycling, and accept supervision to establish a database. Only the combination of internal and external enterprises can establish a firm foothold in the garbage classification and recycling market (Li & Qi, 2019).

Additionally, the government was asked to establish a community-resident core and government-market-society-media core, and finally formed a mode with community residents as the center of multiple stakeholders (Li, 2020). Waste management requires the construction of a scientific whole-process management system with an industrial chain. It ultimately promotes the recycling market power. According to the value stream, it ensures the seamless transfer of material flow (Du & Fan, 2020). There are the business opportunities in garbage classification enterprises. Pursuing advantages of the information technology, scholars explored the nature of garbage classification and revealed the existing or untapped business chances. The Internet platform is used to innovate the garbage governance model, make changes in resource integration, and build channels for multiple parties to participate in environmental governance (Miao & Zhao, 2020). The policy system of garbage classification has increased market values to the solid waste industrial chain and formed an industrial space. The core value of household garbage generation lies in classification, and the whole industrial chain will benefit from garbage classification (Wang, Chen et al., 2020; Wang, He et al., 2020). Collecting security funds and rewards, enterprises and law enforcement departments through waste separation assessment and performance salary of law enforcement departments can improve the overhaul of law enforcement departments and increase the expected revenues of enterprises. It is conducive to the implementation of garbage classification policy and promotes the recycling of resources (Li et al., 2020). Intelligent garbage classification enterprises have great potential. At present, however, Chinese intelligent garbage classification industry is still in the nascent stage. From the initial investment to transportation and processing, this kind of enterprise is a very large project. If an enterprise cannot handle operating costs, it is difficult to maintain its business. In order to make profits, intelligent environmental recycling enterprises demand an optimal combination of classification and transportation treatment, which can promote the sustainable development of enterprises (Wei et al., 2020).

Non-governmental organization

In the process of waste management, supervision is of great importance. However, the lack of supervisory role and inefficient supervision are still the main problems in the process of garbage management. NGO pursues a policy of supervisory engagement with garbage management. In the research on the necessity of the supervision, urban garbage management is not only a technical issue, but also a management issue. In the context of the diversification of public needs, the existing urban garbage management model has problems such as managerial system and scattered management regions. Due to the complexity of urban garbage management, it is necessary to change the fractured management model and build a coordinated urban garbage management mechanism from the perspective of coordination of different actors, functions, and procedures (Li & Hu, 2013). Recruiting responsible personnel with good professional ability and implementing “responsibility system” require cooperation. Additionally, appropriate reward and punishment system are needed (Liu, 2020).

It is encouraged for ordinary people to supervise the entire process of waste management of enterprises (Wu, 2020). Internal supervision generated loopholes. Government by itself is insufficient to overcome ingrained pitfalls of supervision. In this sense, implementing agencies, management agencies and supervisory agencies should be separated (Wang & Zhou, 2016). In addition, market principles can advance general interests. It is necessary to weave together, make transparent implementation, and accept the supervision of the people. For instance, in the process of garbage classification and disposal, Hangzhou has adopted a unitary process and urban-rural coordination for many years. NGOs are the links between citizens, government and enterprises. Waste management in Hangzhou showed that non-governmental organizations were actively involved in promoting garbage classification knowledge and supervising quality and effectiveness (Lu, 2020).

Municipal waste management in Jiangxi Province demonstrated that the environmental responsibility of participants is to stimulate the enthusiasm of third-party enterprises and improve the competition mechanism of supervision market-capital guarantee long term supervision mechanism (Yuan & Fan, 2020). When dealing with the problems arising from the new requirements of governance, the current regulatory system of the garbage treatment industry is lagging. However, the new regulatory reform needs to redefine the
Table 1. Summary of the previous studies regarding municipal waste management in China.

| Author                     | Main findings                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Zhang et al. (2020)        | There is a gap between public demand and supply. Garbage classification is mandatory from top to bottom without taking into account the basic needs of the public’s life, safety, and interests. Classification of municipal solid waste disproportionately stresses the mandatory separation and lacks attention to people's growth needs. |
| Cao and Qin (2015)         | A regulatory system had been lackadaisical in addressing the issues arising from the new requirement of state mandate. The new regulatory reform needs to redefine the regulatory power and its rights of the public. |
| Chen and Shen (2015)       | In terms of waste management, government should coordinate both horizontal and vertical relationship. The interactional relationship needs to be more transparent when the government seeks to cooperate with social enterprises and NGOs. |
| Ding (2020)                | Most citizens have not forged the habit of garbage classification. Despite a high degree of agreement on garbage classification, they do not translate their agreement on the classification of garbage into actual participation. |
| Du and Huang (2019)        | When the government, market, and society are brought into the macro separation system of the quality of waste management can be promoted. |
| Du and Fan (2020)          | Waste management needs to construct a scientific and effective process management with the implementation of integrated technology. |
| Feng and Qin (2019)        | It is of importance to modify an unilateral treatment mode of government, provide an external management environment, and use the information communication technology to improve the convenience of garbage classification. |
| Hu and Chen (2018)         | The specific local characteristics should be considered with regard to setting the garbage management. Waste management should be carried out with a co-productive approach, reflecting the existing characteristics. |
| Li and Qi (2019)           | Low profitability is a defining characteristic of waste classification. In order to make profits, enterprises need to go hand-in-hand with the government externally, strengthen public awareness of garbage sorting and recycling and establish a database internally. |
| Li et al. (2020)           | Linking the garbage classification assessment to the performance-based pay is central to security funds to steer a coordination between enterprises and law enforcement institutions. |
| Li (2019)                  | The weak awareness of garbage classification, the lack of a social atmosphere, and the inaccurate garbage classification standards of citizens are the problems of garbage management. |
| Li (2020)                  | This paper proposed a community-resident core and government-market-society-media core. These cores act on motivating community residents to participate in the garbage classification. |
| Zhen-shan et al. (2009)    | The quantity of municipal waste has soared and will increase in the future. As such, the capacity of treatment became an urgent problem. In order to solve this problem, the quality of public education and managing waste pickers need to be improved. |
| Li and Hu (2013)           | Problems like the fragmented managerial system and jurisdictions are serious. It is necessary to construct a collaborative governance of municipal garbage from the perspective of different stakeholders, procedures, and regions. |
| Liu (2020)                 | Optimal number of supervisors assigned near the garbage disposal point should be two or three. In order to recruit responsible personnel with professional ability, it is necessary to cooperate with an appropriate reward and punishment system because stakeholders act as they are being rewarded or punished. |
| Liu and Li (2019)          | Garbage classification is critical to improving ecological community. The government has administrative resources and legitimacy in community, and thus has more advantages in dealing with externalities, justifying government intervention. |
| Lu and Sidortsov (2019)    | Successful waste management requires volunteers’ commitment. Also, peer-pressure and waste-sorting habit-formation can promote the effectiveness of waste management. |
| Lu and Wang (2020)         | There are some problems in community mobilization, such as low coverage and low efficiency. These led to low awareness of garbage classification policy and low participation rate of citizens. |
| Lu (2020)                  | Hangzhou has formed a multi governance model based on the principle of market operation in the process of garbage classification. Non-governmental organizations are well suited to connect the links between citizens, government, and enterprises. |
| Ma (2020)                  | Social enterprise is directly responsible for the delivery of public service, including recycling, transportation, and final disposal of garbage. |
| Meng et al. (2018)         | A well-designed waste fee levying system can improve the public behaviors. It is an effective way to boost the recovery rate of household recyclable resources. |
| Miao and Zhao (2020)       | The progress of social governance requires a concerted effort of multiple actors. Waste separation process became detrimental to waste governance. Waste management is nurtured by the involvement of the actors in all phases of waste service cycle. |
| Qin and Shen (2020)        | Urban garbage management is changing from voluntary incentive to government-led initiative. Under the leading role of the government, the grass-roots communities maintained the orderly implementation of environmental protection policies. |

(Continued)
supervisory power and its boundaries of the rights of the public and market operators (Cao & Qin, 2015). The quality of waste management cannot be improved upon without horizontal collaboration across various stakeholders. When the government seeks to cooperate with social environmental organizations and enterprises, the interactional relationship needs greater transparency. The vertical communication mechanism of city-community-citizen should maintain its core position to make information exchange smoother (Chen & Shen, 2015). We summarized key findings of reviewing literature in Table 1.

### Discussion

Municipal waste management has received considerable research attention recently and interest continues to grow in China. However, scant research has comprehensively examined this issue. To integrate relevant research, we tap into insights from social governance. Compared with the traditional single governance mode, polycentric governance underscores the decentralization of garbage management. The involvement of multiple actors in garbage management also conforms to the requirements of delicacy of social governance.

Previous studies incorporated a view from governance in the public administration field. This paper can help to inform this debate and shed light on the importance of social governance with respect to garbage management. Nonetheless, waste management has never been a topic of mainstream public administration. We attempted to provide a deeper analysis of how social government has profound effects on waste management. Previous literature studied detailed several downsides of government-led garbage management. It is certainly of interest to public management scholars. Without factoring into social governance, therefore, waste management would not be successful. Through canvassing

---

**Table 1. (Continued)**

| Author                  | Main findings                                                                 |
|-------------------------|-------------------------------------------------------------------------------|
| Tan (2020)              | Most citizens are relatively inexperienced in garbage classification. Despite of a broad agreement on garbage classification, they do not get involved in waste separation. |
| Wang, Jian et al. (2020)| This paper studies the impact of policy incentive and supervision on the treatment of urban garbage classification and recycling. When the government implements punishments, it can effectively restrain the behavior of enterprises. |
| Wang, Chen et al. (2016)| Garbage classification is a very effective method of lessening the adverse impacts of garbage and promoting the profits to the fullest. The whole industrial chain will benefit from garbage classification. |
| Wang, He et al. (2020)  | The Internet garbage sorting company encourages sustainable development. Profitability is a more of a problem for social enterprises. It concentrates on listed companies and the industry leading enterprises’ strategic layout. |
| Wang and Zhou (2016)    | The supervision of overall waste classification is undertaken by government. Internal supervision often generated loopholes. Hence, government needs to embrace market mechanisms to some extent. |
| Wang (2014)             | At the heart was a concern for garbage management were mixed garbage cleaning and transportation, unsound domestic garbage treatment taxes and fees, law-abiding awareness. |
| Wei et al. (2020)       | The market potential of garbage recycling is huge. At present, Chinese waste classification industry is still in the exploratory stage. |
| Wu (2020)               | The role of the people must be factored into the supervision and reporting mechanism of garbage classification. It is encouraged for people to monitor the entire process of garbage classification. |
| Xiao et al. (2020)      | Mandatory waste sorting legislation and specified guidelines were effective for citizens to forge waste separation habits. Coherent recycling network will enhance the quality of waste management. |
| Xu (2020)               | Some communities have mixed garbage cleaning and transportation, leading to slow progress in garbage management. |
| Yu (2020)               | Although China has a lot of relevant provisions on garbage classification, there is no mandatory requirement for citizens to participate in garbage classification, which cannot guarantee effective garbage management. |
| Yuan and Fan (2020)     | This paper summarizes the experience of waste treatment in Jiangxi province. Clarifying the environmental protection responsibilities of participants, and stimulating the motivation of social enterprises improved the supervisory system. |
| Zhang et al. (2012)     | In general, the public is inattentive to kitchen wastes. The cost and method are fundamental to the functioning of waste management. Complex garbage classification lowers public participation. |
| Zhang and Yu (2020)     | The classification of urban garbage can be divided into three stages and further categorized into seven links. In the three stages and seven links, the government should assume the roles of designer, auditor, and inspector. |
| Zhao (2019)             | Citizens lacked knowledge of garbage classification. Most citizens believe that as long as garbage can be placed where they can’t observe it, it did not have a direct negative impact. |
| Minghua et al. (2009)   | The government raised public investment and encouraged private sector participation in order to tackle garbage problems. Regulation on enterprises should be strengthened for better supervision. |
| Zhuang (2020)           | The government has been the central instrument of waste management. However, it has not been sufficiently popularized in a short period of time. A community mainly relies on supervision by managerial personnel to achieve garbage classification. |

---
garbage management research across a wide range of disciplines, we attempted to illuminate relationships among stakeholders and discover insights. With these points in mind, our study looked at social governance. By applying systematic literature review, we identified research gaps, challenges, and opportunities for future studies, which can be particularly relevant for both researchers and practitioners. We are sure that our work is a nice addition to the small but important body of scholarship on waste management.

With regard to municipal waste management, social governance works in various ways. The government guides the garbage classification policy and coordinates social organizations in the garbage transportation. The government is an indispensable part of coordinating stakeholders. However, it is by no means the government does not undertake all the responsibilities. Rather, the government orchestrates overall waste management. The public is hardly acquitted from the charge of inefficient garbage management. Citizens can participate in the decision-making by asking questions and providing feedbacks. City government manages regulatory functions of garbage classification to transparent garbage classification work and real-time monitoring. It can timely report to the society of garbage classification and recycling work in details. Thus it enhances the public’s participation and satisfaction in the garbage management. Garbage management should be guided by the rule of law in social governance, using the characteristics of legal compulsory law to clearly and legally stipulate the rights and obligations of each stakeholder when formulating garbage classification regulations.

This study is not without limitations. A comprehensive account of garbage management would be a massive undertaking. In order to make a more comprehensive analysis of the research problems, this paper classifies garbage according to the multiple stakeholders of garbage management. However, this classification may be biased. In addition, great care should be taken from the findings of our systematic literature reviews. We excluded relevant articles and books or conference papers published before 2005. Moreover, this study focuses on urban garbage management, implying a research lacuna with regard to rural garbage management. Particular problems of governance exist in rural areas (Lu & Sidortsov, 2019). Therefore, future studies should conduct the systematic literature review on rural garbage management.

Furthermore, the strength and ability level of each actor are different. Our paper is mainly aimed at the exploratory research, and may not be fully adapted to the research on detailed behaviors of specific actors. Therefore, one should exercise great caution in interpreting our findings. We hope that this paper helps to shed light and generate deeper understanding of this issue.

Author Contributions
MZ, YM, ML, and HZ generated the research idea, carried out data analysis, and drafted the research article. YL revised the research article for submission. All authors have read and approved the manuscript.

Declaration of conflicting interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

References
Ansell, C., & Gash, A. (2007). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, 18(4), 543–571.
Bi, X. (2020). Difficulties and solutions of municipal solid garbage classification: From the perspective of Citizens’ community participation. *Ningxia Social Sciences*, 4, 114–122. [Chinese]
Booth, A., Sutton, A., & Papaioannou, D. (2016). *Systematic approaches to a successful literature review*. SAGE.
Cao, F., & Qin, H. (2015). Research on the reform of the garbage disposal industry regulatory system-based on the investigation of the background of promoting the modernization of national governance capabilities. *Urban Development Research*, 6, 30–32. [Chinese]
Chen, H. (2019). Application of multi-governance in urban garbage classification. Qingdao Municipal Party School. *Journal of Qingdao Administration College*, 5, 91–96. [Chinese]
Chen, Y., & Shen, L. (2015). On cooperative governance in the basic engineering of ecological civilization construction: Investigation and thinking on the classification and supervision system of domestic garbage in Hangzhou. *Observation and Thinking*, 6, 65–72. [Chinese]
Crossan, M. M., & Apaydin, M. (2010). A multidimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47(6), 1154–1191.
Dai, X. (2019). Solving the “garbage syndrome” tests the wisdom of social governance. *China Population Newsletter*. [Chinese]
Ding, J. (2020). Realistic dilemma and breakthrough path of garbage classification in urban communities: Taking F community in Hefei as an example. *Journal of Xi’an Petroleum University*, 3, 36–44. [Chinese]
Ding, Y., Zhao, J., Liu, J. W., Zhou, J., Cheng, L., Zhao, J., Shao, Z., Iris, Ç., Pan, B., Li, X., & Hu, Z. T. (2021). A review of China’s municipal solid waste (MSW) and comparison with international regions: Management and technologies in treatment and resource utilization. *Journal of Cleaner Production*, 293, 126–144.
Du, C., & Huang, T. (2019). From government-led to multi-governance: Governance dilemma and innovation path of municipal domestic garbage classification. *Administrative Forum*, 4, 116–121. [Chinese]
Du, H., & Fan, Y. (2020). Layout of garbage management system with the whole industrial chain thinking— A case study of Shanghai. *Macroeconomic Management*, 11, 72–77. [Chinese]
Feng, L., & Qin, P. (2019). Practical dilemma and compulsory approach of domestic garbage classification. *China Population Resources and Environment*, 5, 118–126. [Chinese]
Frederickson, G. (1997). *The spirit of public administration*. Jossey-Bass Publishers.
Hu, L., & Chen, J. (2018). “Atomization” or “organization”?—Discussion on the management mode of urban community
garbage classification. *Sichuan Environment*, 4, 104–110. [Chinese]

Keller, E. (2000). *Environmental geology*. Prentice-Hall.

Kerlin, J. A., Lalal, S. A., Peng, S., & Cui, T. S. (2021). Institutional intermediaries as legitimizing agents for social enterprise in China and India. *Public Management Review*, 23(5), 731–753.

Li, B., & Qi, X. (2019). Analysis and solution of problems of “Internet plus” garbage classification enterprises. *The Age of Wealth*, 12, 142–155. [Chinese]

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Italian Journal of Public Health*, 6(2), e1–e34.

Li, D., Yi, X., Chen, M., Yao, Q., Wang, Y., & Tian, G. (2020). Influencing factors and countermeasures of garbage classification in catering enterprises based on game theory. *Science and Technology Promoting Development*, 7, 818–824. [Chinese]

Li, K. (2020). From government to residents: Multi-governance of MSW classification—Enlightenment from the new public service theory. *Renewable Resources and Circular Economy*, 11, 9–12. [Chinese]

Li, M. (2019). Summary and Interpretation of the National and Key Cities’ Garbage Classification Industry Policies in 2019. https://huanbao.bjx.com.cn/news/20190819/1000736.shtml

Liu, D. (2020). Research on my country’s urban garbage classification problems and optimization paths from the perspective of governance system and governance capability modernization. *Special Economic Zone*, 11, 44–46. [Chinese]

Liu, J., & Li, X. (2019). Urban manner: Classified treatment of municipal domestic garbage and good governance of Community. *Henan Social Sciences*, 1, 94–102. [Chinese]

Li, X. (2019). Case Study on promoting garbage classification policy in Jinan City from the perspective of collaborative governance [Master’s Degree Thesis, Jinan University]. [Chinese]

Li, Z., & Hu, J. (2013). The construction of urban garbage management mechanism. *Journal of Guangxi University for Nationalities (Philosophy and Social Sciences Edition)*, 5, 149–155. [Chinese]

Lu, H., & Sidortsov, R. (2019). Sorting out a problem: A co-production approach to household waste management in Shanghai, China. *Waste Management*, 95, 271–277.

Lu, J., & Wang, C. (2020). Community Mobilization and citizens’ participation in domestic garbage classification - Taking a city garbage classification community as an example. *Rural Economy and Technology*, 10, 10–11. [Chinese]

Lu, K. (2020). Diversified Co-governance models for the classification and treatment of domestic garbage in Hangzhou: Status quo, problems and countermeasures. *Environmental Protection and Circular Economy*, 3, 16–20. [Chinese]

Macpherson, A., & Holt, R. (2007). Knowledge, learning and small firm growth: A systematic review of the evidence. *Research Policy*, 36(2), 172–192.

Ma, R. (2020). Research on Xi’an urban garbage management—an analysis based on stakeholder theory. *Journal of Shaanxi Administration School*, 4, 120–126. [Chinese]

Meng, X., Wen, Z., & Qian, Y. (2018). Pluralistic subject based simulation for household solid garbage recycling behavior. *Resources, Conservation and Recycling*, 128, 535–545.

Mian, M. M., Zeng, X., Nasry, A. A. N. B., & Al-Hamadani, S. M. Z. F. (2017). Municipal solid waste management in China: A comparative analysis. *Journal of Material Cycles and Waste Management*, 19(3), 1127–1135.

Miao, Q., & Zhao, Y. (2020). How do Social Enterprises participate in social governance?: A case study in the field of environmental protection and its enlightenment. *Southeast Academic*, 6, 130–139. [Chinese]

Minghua, Z., Xiumin, F., Rovetta, A., Qichang, H., Vicentini, F., Bingkai, L., Giusti, A., & Yi, L. (2009). Municipal solid waste management in Pudong new area, China. *Waste Management*, 29(3), 1227–1233.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med*, 6(4), e1000097.

Moore, S. A. (2012). Garbage matters: Concepts in new geographies of waste. *Progress in Human Geography*, 36(6), 780–799.

Nanda, S., & Berruti, F. (2021). Municipal solid waste management and landfilling technologies: A review. *Environmental Chemistry Letters*, 19(2), 1433–1456.

Qin, X., & Shen, Y. (2020). Community participation differentiation and government-led orientation in garbage sorting pilot: An empirical analysis based on BN city. *Xue Hai*, 6, 135–141. [Chinese]

Sharholy, M., Ahmad, K., Mahmood, G., & Trivedi, R. C. (2008). Municipal solid waste management in Indian cities – A review. *Waste Management*, 28(2), 459–467.

Sicilia, M., Guarini, E., Sancino, A., Andreani, M., & Ruffini, R. (2016). Public services management and co-production in multi-level governance settings. *International Review of Administrative Sciences*, 82(1), 8–27.

Sun, T. (2015). Five perspectives of social governance research: Its existing problems and development trend. *Journal of Beijing Administration College*, 1, 67–72. [Chinese]

Tan, Y. (2020). Research on classification and treatment of domestic garbage in urban communities [Master’s Degree Thesis, Hunan Normal University]. [Chinese]

Vergara, S. E., & Tchobanoglous, G. (2012). Municipal solid waste and the environment: A global perspective. *Annual Review of Environment and Resources*, 37, 277–309.

Visvanathan, C., & Trankler, J. (2003). Municipal solid waste management in Asia: A comparative analysis. Proceedings of the Workshop on Sustainable Landfill Management, Allied Publishers Pvt Limited, Chennai, India.

Voorberg, W. H., Bekkers, V. J. J. M., & Tummers, L. G. (2015). A systematic review of co-creation and co-production: Embarking on the social innovation journey. *Public Management Review*, 17(9), 1333–1357.

Wang, D., Jian, L., & Fu, S. (2020). Study on the incentive and supervision mechanism of urban garbage classification, recovery and treatment. *China Environmental Science*, 7, 3188–3195. [Chinese]

Wang, H., Chen, W., & Liu, X. (2020). Emerging business opportunities under the guidance of garbage classification policy — From the perspective of internet enterprises. *Research
Zhang et al. (2020). Development status and countermeasures of “internet plus garbage classification” enterprises. *Guangdong Science and Technology, 9*, 51–56. [Chinese]

Wang, J., & Zhou, Y. (2016). The dilemma and countermeasures of urban garbage disposal from the perspective of public management. *Industrial Safety and Environmental Protection, 4*, 53–55. [Chinese]

Wang, S. (2014). Classification and treatment of urban community garbage in China: Connotation, problems and thinking. *Journal of Beijing Institute of Industrial Technology, 1*, 112–115. [Chinese]

Wei, X., Wang, Y., & Jiang, D. (2020). Research on the sustainable development of intelligent environmental recycling enterprises. *Chinese Small and Medium-sized Enterprises, 4*, 158–159. [Chinese]

Wu, W. (2020). Research on people’s participation in garbage sorting management in my country. *Theoretical Research on Urban Construction, 17*, 112–113. [Chinese]

Yu, H. (2020). Study on the classification and treatment of municipal domestic garbage under the cooperation of multi-agents. *Brand Marketing of Time-honored Brands, 9*, 53–54. [Chinese]

Yu, K. (2018). Governance and good governance: A new framework for political analysis. *Fudan Journal of the Humanities and Social Sciences, 11*, 1–8. [Chinese]

Zhao, Y., & Peters, B. G. (2009). The state of the state: Comparing governance in China and the United States. *Public Administration Review, 69*, S122–S128.

Zhu, Y., Zhang, Y., Luo, D., Chong, Z., Li, E., & Kong, X. (2021). A review of municipal solid waste in China: Characteristics, compositions, influential factors and treatment technologies. *Environment Development and Sustainability, 23(5)*, 6603–6622.