"Conflict" or "Cooperation": A Study on The Spontaneous Order of Urban Public Space Development from The Perspective of Stakeholders

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Abstract. Urban public space nourishes social relations, at the same time, the evolution and development of public space are also influenced by social relations. As an important factor affecting the development of public space, the interest relation of citizens presents the characteristics of conflict or cooperation in the occupation of public spaces and finally presents itself in the space form. Based on the point, this paper attempts to explain the evolution and development of urban public space from the perspective of stakeholders, and on this basis investigates the generation mechanism of spontaneous order in the development of urban public space. To meet the research aims, this paper first clarified the inherent meaning that space reflects and shapes social relations, and then selected a certain urban area of Jinan in northern China for the case study. Through the data collected from Google earth history images, interviews, and published reports, the evolution of the major public spaces in this case from 2003 to 2020 was objectively presented. On this basis, the author analysed the social relations, appeals, and actions of various stakeholder groups (such as local people and non-local traders) in different periods in this case, as well as the staged outcomes of their effects on the public space. Finally, a game model of stakeholders was established. The results indicated that the development of a city is a process that mitigates the conflict between social and public space resources. In the occupation of public space resources, the relationship between the stakeholders is dynamic: when the cost is high and the return is low, the stakeholders show a trend of "conflict"; when costs are low and returns are high, the tendency to "conflict" diminishes.; When costs and benefits reach some kind of equilibrium, "cooperation" tends to rise and gradually leads to spontaneous order. Although this spontaneous order has its limitations due to the limited rationality of its participants, it still can play a positive role in the development of urban public space. In the concluding section, the paper proposes an optimization strategy of interest integration and coordination for urban space development, which may be of reference value for architects and government management to actively guide this spontaneous order in urban planning and urban governance.

1. Introduction
Urban public space is an important place where independent individuals converge in space, interact with each other, and build social relationships. In the occupation and use of public space, these independent individuals become conflicting or cooperative stakeholders out of different demands. The spatial game among stakeholders in pursuit of the maximization of interests is the driving force for the development of the city. Thus, the relationship of interest is the core of the social relationship constructed by the individual. Especially in the highly urbanized 21st century, with the rapid and
continuous growth of the urban population, the competition for limited urban space by social groups representing different interests has become an important issue in urban development. Therefore, it is necessary to study the evolution and development of urban public space based on the interests of social individuals and groups.

The study of the relationship between space and society began as early as 1974, the French Marxist philosopher Henry Lefebvre proposed that space is filled with social relations, which are not only supported by social relations but also produce and be produced by them [1]. Since then, David Harvey has proposed the classic social space theory about the three-levels in capital circulation and space [2], which has received the attention of the social sciences including human geography, urban planning, and many other disciplines. On this basis, many scholars have analysed and extended the connotation and essence of the relationship between space and society from different perspectives such as space politics, human geography, economics, and urban planning [3-8].

Through the brief literature review, it can be seen that most of the previous studies carried out theoretical research and qualitative analysis at a macro level. At the same time, most researchers paid their attention to the urban space completely dominated by the government and other urban management levels, underestimating or even ignoring the active role of the individuals and groups in the development of urban space.

This brings to the purpose of the current study. Focused on the cooperation and coordination among non-government participants, this paper explained the diachronic evolution of small and medium-sized specific urban public space from the perspective of stakeholders. On this basis, this paper aims to investigate how the spontaneous order generates in the evolution of urban street space and how to actively guide this order.

2. Case study

2.1 Research methods

In recent years, Google Maps and other open-source data have been widely used in urban space research. In this study, a certain urban area of Jinan, a city in northern China, was selected as a case study. Using field observation and Google earth history images, supplemented by analysis graphics, the author represented and compared spatio-temporal data and spatial patterns of activities over four important periods during 2000~2020 of the typical street spaces in the case. On this basis, the diachronic evolution of this street space was analysed from the perspective of stakeholders: firstly, different stakeholders were clarified; secondly, the changes in the relations of stakeholders and their demands in different periods, the actions they took, and the phased outcomes of street space pattern were analysed; finally, a game model of stakeholders in the evolution of street space was established.

2.2 Spatial characteristics of the case

In the process of urban renewal, the management from the government level is sometimes temporarily absent in some urban public Spaces due to various objective factors. This kind of public space is the area where the game between stakeholders is the most intense and common, and it is also the area where the bottom-up spontaneous order has the most tendency to form. The case selected in this paper is one such public spaces.

The case is located in the old districts of Jinan in the north of China. The buildings in the research scope (figure 1) are mainly 6-story houses, most of which were built before the 1990s. The public space analysed in this paper, the west extension section of South Shanda Road, is located in the centre of this residential area. By comparing Google earth history images taken between 2003 and 2020 (figure 2), it can be found that this section of urban road was in a completely different state of use: in the middle of the now busy road, there was a large market in 2005 (figure 3). The market built in the middle of a road
is not common in any city in the world. Therefore, the background and reason for its formation should be explained firstly in this paper.

Figure 1. Case location and research scope [9]

Figure 2. Diachronic evolution of case [9]

Figure 3. Street view of the case from different time

First of all, from the perspective of the spatial form (figure 4, a), the west extension section (i.e. Section ②) within the scope of this study has a corresponding relation with the whole section of South Shanda Road in both width and position. This is the overall planning for the city by government management. However, the two existing elements in the area became the main obstacles that prevented it from opening to traffic as planned. One is the shantytown lied on the east side of the road, which directly blocked the connection of the ① and ② sections. The other is the moat on the west side, which made the west extension of South Shanda Road a "Dead-end Road". At that time, the cost of clearing these two obstacles in terms of time, money, and technology was much higher than the convenience of dredging the urban road network and relieving the traffic pressure. Therefore, the traffic plan of this section has been put on hold by the management level.

Secondly, this paper classifies the road conditions within the research scope (figure 4, b). The periphery of this area is surrounded by three major urban roads and a moat, along which there are two south-to-north
secondary urban roads, all concentrated at the western edge of the plot. There are also four internal roads within the area, but none of them can form a connected traffic route in the north-south or east-west directions, which means the connection with the main road network of the city is insufficient. Thus, before the demolition of the shantytown on the east side and the completion of the bridge project on the west side, the vehicles outside the residential area can merely drive along the periphery of the plot.

The objective situation described above brings two results: Firstly, the boundary closure caused by the organization of the road network inside the plot virtually enhances the exclusivity of public space resources, reducing the actual users of the street space from all citizens to citizens within the area. Secondly, although this section still has the scale of urban roads, its function has changed. The west side of this section retained part of the traffic space due to the connection of two north-south urban secondary roads, while the east side of this section completely lost the original traffic function. This transformation led to the temporary absence of government level in urban management. Under the combined effect of the two results, this unutilized urban public space became the public resource that stakeholders in this area compete for.

2.3. Stakeholders in the evolution of space
The word "stakeholder" in its current use first appeared in an internal memorandum at the Stanford Research Institute in 1963 [10]. In the beginning, this theory was mainly applied to economic management. In 1984, Freeman gave a broad definition of stakeholder as 'any group or individual who can affect or is affected by the achievement of the organization's objectives' [11]. Based on this, this paper applies the stakeholder analysis to the study of urban public space and defines stakeholders as "any group or individual who can affect or is affected by spatial development".

| Figure legends | Road grade | Width | Traffic capacity | Road conditions | Service condition |
|----------------|------------|-------|------------------|-----------------|-------------------|
|                | main urban road | 20–48m |                   | smooth          | frequently used by local and outsiders |
|                | minor urban road | 15m   |                   | smooth          | more frequently used by local than outsiders |
|                | main regional road | 10m   |                   | bumpy           | mainly used by local |
|                | minor regional road | 5–7m  |                   | bumpy           | rarely used by outsiders, especially vehicles |

Figure 4. Spatial characteristics analye base on the history image in 2003 [9]
2.3.1 Identify the stakeholders in this case. In this case study, stakeholders can be divided into two camps: locals and outsiders. "Locals" mainly refers to residents of the residential units in the research area. Below this level, they can be further divided into Local-Merchants (LM; mainly residents with shops along the street) and Local-Residents (LR) according to whether they are engaged in commercial activities. The opposite of "locals" is "outsiders", mainly Outside-Vendors (OV) and Outside-Investors (OI) from outside the area.

2.3.2 Identify the "Cost" and "Benefit". The nature of public spaces is a kind of public resources. Therefore, space game is a kind of allocation of space resources. Due to the temporary absence of government management, private individuals and groups within the area became the most important and the largest number of interest subjects in the game of spatial evolution. Their occupation of public resources was driven by a demand for security and exchange.

For LR, the space resources themselves are a kind of cost. They benefit from a convenient service resource by paying for the "convenience" and "cleanliness" of the space to a certain extent. For OV, the customers within the service radius are fixed, which can be converted into benefits through selling services, while the cost is the service itself and the goods sold. For local merchants and outside investors, the costs should also include the fees to be paid for using or leasing the sales space.

2.4. Spatial game process analysis
As the public space resources within a clear boundary are limited, the increase of "benefits" of some interest subjects may lead to the decrease of "benefits" or the increase of "costs" of others. With the dynamic change of cost-benefit between stakeholders, the relationship between stakeholders also transforms between cooperation and conflict, which then causes them to make different action strategies in the trend of turbulence and stability, bringing different outcomes in the evolution and development of public space (figure 5, 6).

![Figure 5. The evolution of space from satellite images [9]](image-url)
2.4.1 The first stage -- the invasion of outsiders. Since some time ago, this section has become the first choice for OV due to its large space and central location. In this stage, the main stakeholders participating in the space game were LR and OV. LR satisfies the daily purchase demand by providing the space that has lost the original traffic function and has a low utilization rate. OV used the space and obtained customers in this area without paying any rent, making benefits through trading. At this stage, stakeholders obtained higher benefits through lower costs to meet their own needs, so the invasion of foreign vendors did not cause significant conflicts. In the absence of restraint, OV lined the streets in a state of disorder.

2.4.2 The second stage -- competition between two business activity. From some time to 2003, business activity in this area diversified. Residents on the ground floor along both sides of the street saw the possibility of making benefits through selling services. As a result, they opened some rooms to the street and changed them into shops. Some of them even directly occupied the street and added huts for selling, forming a competitive relationship with outside vendors. Thus, LM and OV were the main stakeholders participating in the spatial game at this stage.

Due to the occupation of the space on both sides of the street by the OV, the business of LM is disturbed. Meanwhile, these OV also divided part of potential customers of LM. This situation led to the result that compared with OV, LM obtained lower benefits while paying more costs. In this case, the conflict between LM and OV is highlighted. Due to the weakness of space rights, OV was driven to the middle of the road to continue their business activities.

2.4.3 The third stage -- Collective action and mutual restraint. Between 2003 and 2005, there were two states of stakeholder relations. On the one hand, the move of the OV from side to the middle of the road has abated the conflict between stakeholders, LM and OV occupied respectively on the side or middle of the street to engage in business activities, both to reach a mutually beneficial and win-win "cooperation".

On the other hand, although the benefits obtained by LR was relatively stable, the spatial cost paid by LR is greatly increased due to the rapid deterioration of road mobility and spatial environment quality caused by the disordered occupation of public space by OV. As a result, the LR, especially those living along the street, shown extreme dissatisfaction with the current space allocation and called for the emergence of spatial order.

In this case, the OV move into the unified construction of vegetable sheds, reserve the passage for pedestrians and bicycles, and guarantee the living environment quality of LR by organizing the selling space in the square in the middle of the road. The evolution of space from chaos to uniformity is visible in the satellite images.
2.4.4 The fourth stage -- Benefit maximization and spatial integration. In 2005, with the gradual restoration of the original traffic function on the west side of Shanda South Road, the flow of vehicles brought huge business opportunities. At this stage, LM and OI became the main stakeholders to participate in the space game.

In the early stage of the resumption of traffic, most LM maintained the status of using their room along the street for commercial activities. Compared with OI, they paid less cost and obtained higher benefits in the short term. However, in the long run, by renting and integrating multiple stores, OI opened larger shops with more diversified products, which grabbed most of the customers of local merchants and thus led to the continuous decline of LM's benefits. In this case, LM was coming to realize that both sides can maximize benefits by renting out their rooms to this better-capitalized OI. This cooperative relationship was manifested as the gradual integration of the space interface along the street.

3. Results and discussions

3.1 Cost-Benefit game model establishment

Through the above analysis of the "Subject-Action-Outcome" game process, it can be seen that the public resources within a certain space are limited, while each subject hope to obtain a larger benefit while paying a smaller cost. As a result, the common interest appeal of different individuals or groups is the key factor that effectively triggers the collective action and spontaneous order of stakeholders. Therefore, this paper established a game model with cost and benefit as the axis (figure 7).

As shown in Figure 7, the game types among interest subjects were divided into four categories according to "cost-benefit". In the first quadrant (High cost, High benefits), both costs and benefits are on the rise. Owing to the high costs, subjects sharing risks need more cooperation to ensure higher benefits, which promotes mutual benefit among stakeholders. Thus, it's a stable cooperative-game; In the second quadrant (High cost, Low benefits), the resource allocation reaches a state of extreme imbalance. The fact that the interest subjects can only get lower benefits at higher costs give a rising trend of contradictions. Thus, it's a prominent conflict-game; In the third quadrant (Low costs, Low benefits), both benefits and costs decrease. To avoid lower benefits or higher costs, the stakeholders participating in the space game hope to ensure the balance of overall benefit distribution through cooperation. Hence, there is a cooperative trend, but it is an unstable cooperative-game; In the fourth quadrant (Low cost, High benefits), the benefits of some stakeholders are improved without increasing
or even decreasing the cost. The contradiction between the stakeholders can be effectively alleviated since their interest demands are fully satisfied. Therefore, it is a kind of mitigation conflict-game. This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

3.2 The generative mechanism of spontaneous order
The game model established was used to summarize the state of stakeholders in each stage of the spatial game and thus to analyse the generative mechanism of spontaneous order in the case.

### Table 1. State of stakeholders in each stage of the spatial game

| STAGE | MAIN SUBJECT | COST-BENEFIT | ACTION | OUTCOME |
|-------|--------------|--------------|--------|---------|
| First | LR; OV       | low cost high benefit | inaction | disorderly |
| Second | LM           | high cost low benefit | conflict | chaos |
|        | OV           | low cost high benefit |         |         |
| Third | LR; LM; OV   | high cost high benefit | collective action | orderly |
| Fourth | LM; OI       | high cost high benefit | cooperation | integrated |

As shown in Table 1, in the initial stage of the invasion of OV, the property of the public space was non-exclusive. Both LR and OV were in a state of low cost and high benefit. Therefore, the conflict between interest subjects was not prominent, which is a mitigation conflict-game. The spatial management presents a state of inaction and non-participation, which led to the outcome of an initial disorder of the spatial form.

In the second stage, due to the emergence of LM, the property of the public space began to show a kind of exclusivity. On the one hand, the competition between LM and OV makes the price of goods yield to LR to some extent. As a result, the maintenance of low cost and high benefit reduces the tendency of LR to initiate conflicts. On the other hand, the LM was in a state of high cost and low benefit due to the occupation of street space by OV. In this case, the contradiction between LM and OV was prominent, which result in a prominent conflict-game. The conflict led to a kind of conscious destruction of space by interest subjects, which led to the outcome of artificial chaos of the spatial form.

In the third stage, the spatial resources show different attributes among different groups results from the complex relationship between stakeholders. For LM, the division of labour with OV on the types of goods sold brought higher benefits and led to stable and win-win cooperation. However, due to the environmental degradation caused by the occupation of street space by OV, LR entered into a state of high cost while still enjoying a high benefit. This triggered a collective action by LR demanding spatial order and environmental improvements. In this case, in order to prevent the further reduction of benefits caused by the loss of customers, the OV made concessions in the space game: by raising their selling costs -- moving to the paid vegetable shed--and taking a collective action to spontaneously manage the selling environment, to ensure the interests of LR. At this stage, the stakeholders participating in the space game finally enter a state of high cost and high benefit. In this state of sharing risks and benefits, stable cooperation was embodied both inside and outside the interest group, which led to the outcome of an artificial order of the spatial form.

In the fourth stage, the property of the public space changed from exclusive to non-exclusive. At the beginning of this stage, due to the low cost and high benefit, the contradiction between LM and OI is not prominent. With the appearance of the advantages of OI, LM gradually enters into a state of low cost and low benefit, which eventually promotes LM and OI to reach a mutually beneficial relationship by exchanging the right to use houses and working capital. This kind of stable cooperation
at a high cost and high benefit eventually led to the outcome of an orderly evolution and development of space interface.

It can be found by summarizing the above discussion that firstly, due to security or exchange requirements, the property of public space resources changed dynamically: non-exclusive resources become an exclusive resource through an enclosure, while exclusive resources can also become non-exclusive resources through an exchange. Secondly, in the competition for urban public space resources, the relationship of stakeholders also changed dynamically, and shown two trends of "conflict" and "cooperation": when the cost was high and the benefits were low, the stakeholders showed a trend of "conflict"; when costs were low and benefits were high, the tendency to "conflict" diminished. In the state of conflict, either the mitigation type or the prominence type is not conducive to space development, which is reflected in the spontaneous disorder or artificial chaos.

When costs and benefits were in equilibrium, "cooperation" tended to rise and the balance under high risks gradually led to spontaneous order. This spontaneous order can not only trigger a collective action within the stakeholders but also promote mutual supervision between the stakeholders, giving a rising tendency of spontaneous governance of the space, thus playing an active role in forming a more orderly form and a more pleasant environment of public space.

4. Conclusions

By observing and analysing the game and diachronic evolution of a specific urban space, the research set out to determine that under the condition of reasonable allocation of resources, the stable cooperative-game between stakeholders can be established and promote the orderly evolution of space, thus, confirmed the existence of spontaneous order in the process of urban development.

The spatial game between "locals" and "outsiders" discussed in this paper is also taking place in the process of urbanization in a larger scope. Urban development is a process that alleviates the conflict between social and public space resources. It is unavoidable for planners and the government to solve the problem that different interest groups rob limited urban public space resources.

Thus, this study has some strategies of interests integration and coordination for urban street space development: Firstly, it is important to promote the balance of stakeholders, expand the development model of a stable cooperation-game, and give full play to the positive role of internal collective action and external mutual supervision of stakeholders on the space development; secondly, more attention should be paid to the vulnerable groups in the space game, and the development space of them needs to be reserved in the overall planning; thirdly, diversified and sustainable spatial configurations can be created to show the considerations of government management in the face of the growing demand for urban service resources; fourthly, while there are limitations of interest subjects due to their limited rationality, this paper encourages the government and urban planner to appropriately open up public participation in urban design and give citizens appropriate power of self-management in space governance. These strategies may provide a positive reference for the urban planner and the government to actively guide this spontaneous order in urban planning and governance, and ultimately create a more humane and inclusive socio-spatial environment.

However, there was an obvious limitation in this study: the number of the case selected was not enough. The author will continue this study in the future and expect more research achievements to be carried out in the field of space and social relations through more case studies. The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.
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