Polycentric Governance of Crisis from
the Perspective of Information Economics:
An Empirical Study of Wenchuan Earthquake

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Abstract: A crisis or a catastrophe will make the society into a temporary disorder situation. Under this circumstance, disaster victims need urgent help from the society. It means that, there are great demands for the public resources. The greater the crisis is, the supplies of public resources will be more urgent. This paper points out the supplies of public resources do not always meet well with the demands under the condition of crisis, especially if the characteristic of crisis management is strong-government but weak-society. From the perspective of information economics theory, this paper argues that the fundamental information asymmetry between the demands for the public resources and the supplies of them is the critical factor we have to take into consideration. And based on the empirical study and filed research of Wenchuan Earthquake, we find out that in order to solve the problem of information asymmetry and enhance crisis management capabilities, it is necessary to gradually change the structure of strong-government but weak-society, and transitions from crisis management to crisis governance. To achieve this goal, it requires polycentric governance, which is asking for seamless cooperation of government organizations, social organizations and enterprises, to cope with the crisis jointly. The case of Wenchuan confirms this model can solve the problem of information asymmetry and will effectively deliver the provision of public resources.

At 14:28, May 12, 2008, a magnitude 8 earthquake took place in Wenchuan, Sichuan province. This is the most destructive Earthquake since Tangshan Earthquake in 1976. Earthquake hit about 50 square kilometers of four hundred and seventeen counties in five provinces and cities in China. According to the ministry of civil affairs web site, Wenchuan Earthquake caused a direct economic loss of 845.1 billion RMB, as of September 25, 2008, 12, Sichuan Wenchuan Earthquake has confirmed that 69227 people were killed and 374643 injured, 17923 people missing.
After the earthquake, the Chinese government immediately launched the emergency response mechanism and emergency general mobilization of the people's liberation army, at all levels of government emergency response, various NGOs and private self-organizing emergency action, launched an unprecedented big rescue action. According to the ministry of civil affairs reported that by the end of September 25th, 2008, the country received donated money from all walks of life both at home and abroad which is up to a total of 59.468 billion RMB, and a total of 1.5797 million tents, 4.8669 million bed quilt, clothes 14.1013 million, fuel oil 4.146 million tons, 8.858 million tons of coal. By 28th February 2009, the social donation amount has reached 76.022 billion RMB. In the earthquake rescue, more than 300 volunteers went to the disaster area to participate in disaster rescue.

In front of such a huge disaster, how NGOs will act? Huge demands take place in earthquake disaster emergency so that government can't deal with the situation alone. And NGOs have a lot of constraints itself in the emergency, such as legitimacy, such as resources, talent, capital, information, skills and so on. At the same time social aid resources including supplies, volunteers continue to flock to the disaster area. Under the condition of the premise, we need to research what is the essence law of the public supply and demand, and how to solve the contradiction of supply and demand under the condition of a disaster.

The analysis of public resources demands under the catastrophic

Catastrophe will make the social situation into a temporary disorder situation, and the demands for public resources in the disaster area will be urgent. At this point, public resources mainly include life rescue, life maintenance, psychological support, and restore the quality of life, livelihood development.

These demands can be summarized as three aspects: the human, financial and material resources; demands of human, financial and material resources, and at the same time it will produce information demands and the demand for coordination. We will then discuss different stages of the disaster and the characteristics of the law of public resources demands.

Three stages of the catastrophe response

Most of the relevant literatures divide catastrophe response into three stages, namely the stage of emergency rescue, the stage of transitional resettlement and the stage of reconstruction. This paper will discuss three-stage classification method, but what different is,
this paper argues that stage division is related with the extent of catastrophe. Here, we take Wenchuan Earthquake as the example. The stage of emergency rescue in Wenchuan roughly went from May 12 to May 19, the stage of transitional resettlement went from May 20 to September 4, and the stage of post-disaster reconstruction for the next three years. The reason for this division is, under normal circumstances, the golden time for the life rescue is within 72 hours of the disaster, but usually there will be aftershocks after a large earthquake. So the time for emergency rescue will be much longer. In fact, the last survivor of Wenchuan Earthquake was rescued nearly a week later. Based on what is mentioned above, the paper defines the stage of emergency rescue as the first week after the earthquake; the stage of transitional resettlement as within three or four months after the stage of emergency rescue. Here we regard “Wenchuan Earthquake Recovery and Reconstruction Plan” issued by the State Council on September 19, 2008 as the division marks. And the stage of reconstruction in four months from May 20 to September 19, the stage of post-disaster reconstruction for the next three years.

The analysis of catastrophe response to the material demands of the various stages

The stage of emergency rescue When the sporadic disasters suddenly occur, the lives of the people and property safety are facing with serious loss and threats. Life rescue, human and material resources are urgently needed, particularly the demand for professional rescue teams and medical teams. Also some other emergency rescue supplies such as life-saving drugs, food, temporary tents are required as well. This stage does not have highly professional requirements for volunteers who are mainly involved with site clean-up, supply distribution, casualty care.

The stage of transitional resettlement By the end of emergency rescue which is mainly about life saving, demands for life maintenance and psychological support increasingly become the main aspect including supplies of daily living, transitional housing placement and etc. The professional requirements for this stage for volunteers increase.

The stage of reconstruction The demands of this stage are mainly focused on the psychological rescue, and restore the quality of life and livelihood development. The materials of urban and rural infrastructure construction, community culture and other aspects are required. There is a significant increase in demand for all types of construction funds.
We divide catastrophe response into three stages which is expressed in diagram as follows:

As it is shown above, when the disaster occurs, emergency supplies suddenly appear, such as rescue equipment, medicines, food and so on. With the progress of response to the disaster, daily necessities, transitional housing placement come after. When it comes to the stage of reconstruction, it mainly relates to infrastructure construction, permanent housing, production and livelihoods. As the operation of the market mechanism resumes, reconstruction materials can be obtained through the market, and therefore this stage requires a lot of money.

The analysis of catastrophe response to the requirements for volunteers of the various stages

Similarly, the situation of volunteers can also be expressed as follows:
As shown, when the disaster occurs, the disaster is in a huge demand for volunteers. In the initial stages of response to disaster, disaster area needs volunteers to provide rescuing, caring, so it requires both professional and non-professional volunteers at this time. As it comes to the end of process of response to the disaster, as well as emergency rescue, life in disaster areas has been partially restored, some people can take care of themselves; there comes with a downward trend in the demand for non-professional volunteers when the proportion of professional volunteers (such as psychological counseling and psychological intervention volunteers) greatly increases.

**The analysis of demand and supply of charity resources under the catastrophe**

When people are aware of the seriousness of catastrophe, they will respond to the public demand from the disaster areas. As result, a huge supply of public welfare will be generated. Here will be discussed the law and characteristics of the charity supply and demand from different stages of disaster. We will focus on the volunteers’ supplies, goods supply.

**The analysis of the supply of charity materials under the catastrophe**
The stage of emergency rescue When people are aware of the seriousness of the disaster through various media and related pathways, they will be voluntary to lend a helping hand. In this sense, it is the public interest demands created public welfare supply. So the public welfare supply relative to the public welfare demand will be lagging behind. At this stage, the social populace's humanitarian passion will make donations and aid poured into the disaster area. Volunteers, a large number of voluntary organizations, will participate in emergency rescue, including cleaning, materials distribution, the wounded care, etc.

The stage of transitional resettlement At this stage, volunteers continue to flood; Non-professional volunteers appear to a surplus, but transitional materials are relatively scarce, and donations will reach a peak during this period, and then slowly decrease. At the end of this late stage, nonprofessional volunteers began to fled, and various social organizations are also gradually back to the original main work area, and to aid the disaster area by their own expertise.

The stage of reconstruction At this stage, public supply will encounter a rapid decline, the market mechanism is restored and basic construction materials can be accessed through the market. At the same time, the non-professional volunteers largely quit out from the disaster areas. The remaining volunteers needed are professional. Funds at this time can be used are from government's fiscal input and the previous accumulation of social donation.

The analysis of donations in different phases during catastrophe

Donation data of Money flows in the Wenchuan Earthquake can be cited from Zhongmin Charity Information Center. Earthquake donation can be exactly cited in the first several days, then average daily data is used in this paper for researching convenience. Up to 28th February 2009, donation amount of Wenchuan Earthquake is 76 billion RMB. From May 13th, 2008 to May 21th, day donation amount were 12.00, 13.00, 21.30, 8.05, 5.88, 29.22, 32.13, 17.66, 32.13 (unit: one hundred million RMB); From May 22nd to May 30th, the daily average donation amount is 2.657 billion RMB. From June 1st to June 30th, the average daily donation amount is 495 million RMB; From July 1st, 2009, to February 28th, the daily average donation amount is RMB 0.85 million. As shown in the figure below:
Figure 3 Current Flow of Donation

As shown, the social donations basically present a rapidly increasing first and then slowly decreasing afterwards. Specifically, at the initial stages of disaster, donations are increasing rapidly. In general, donations of the first week mainly come from institutions, and more than 50% of total donations gathered in the first three weeks.

The analysis of the volunteer service supply in each stage during the respond to disaster

Relevant data of volunteers cannot be accessible, but we can make a rough estimate according to the relative web pages and interviews. Schematic diagram is as follows:
As shown, when people are aware of the seriousness of this disaster through various media, they will lend a helping hand; some of them may be directly involved in the process of earthquake rescue. But flood peak of volunteers will have some lag because of time lag. Demand for non-professional volunteer will be gradually reduced accordingly when the disaster gradually relieved. But professional volunteers were not the case; they plan to have a long-term involvement from the beginning, so the supply of professional volunteers will be hold in a high level still in recovery and reconstruction phase.

**The contradiction between supply and demand of public resources during the catastrophe**

First of all, let’s discuss the asymmetric information as well as the blindness and disorder of rescue during the catastrophe. Under the conditions of catastrophe, transportation and communications are damaged severely, coupled with the large-scale damaged area, and the limited information pipelines, thus many requirements may not get immediately reflected. The problem caused by information asymmetry is that it is unable to know the comprehensive stricken situations in time, such as where specifically suffers from disasters and what are the specific needs of the victims of disaster? Due to information asymmetry, at the beginning, the rescue will present the feature of disorder and blindness. At that moment, commonweal resources cannot be effectively allocated, which may possibly lead to a phenomenon that volunteers and supplies flock together in one place.

Secondly, in the catastrophe, supply and demand of commonweal rescue resources are inconsistent. This is mainly caused due to the personalized demand. Under the condition of the catastrophe, there are various demands in the catastrophic area. Therefore, phenomenon of inconsistency of supply and demand may exist. Especially in microcosmic individual level, due to the fact that each individual's condition is different, the rescue is faced with various personalized demands. The investigations, discoveries, reflections and satisfactions of personalized demands all need professional investigation services to realize.

Moreover, the commonweal aid supply in a catastrophe is lagged. To compare the supply and demand in commonweal curve graph, we can find out that the emergent demand in
commonweal increase instantly along with catastrophe. However, the infrastructures like communication and transportation are enormously damaged and the channels of information and resources get blocked in the catastrophe. Therefore, the rescue goods which the disaster area needs badly may not be delivered timely to victims due to the lagging of commonweal supply in urgent need.

Finally, the supply and demand of public rescue resources are unbalanced in the catastrophe. From the perspective of the whole process of disaster rescue, the relation of supply and demand is not balanced. According to the previous analysis of public demand and supply in the catastrophe, we can find that in the catastrophe both of them have their own rules and characteristics. The social public commonweal supply is more during the early stages of the catastrophe, but is less during the later stage. For the demand, the demand of various goods and materials vary with the time period of the disaster. At the initial stage of the disaster, emergency rescue materials are needed, while at the later stage, more materials, especially fund is needed for restoration and reconstruction. The commonweal needs for this matter is satisfied by the savings of supply in early disaster response stage. Therefore, it is an important question on how to realize the match between the overall supply and demand. Specifically, we must move the peak to fill the valley, so that the supply can be adapted to the demand.

In all, it is extremely important, how to minimize the supply lag as possible and how to materialize a smooth supply transfer timely to effectively rescue the victims within limited time in the catastrophe. At the same time, supplies must be offered reasonably to realize the microcosmic accordance and overall balance.

Through the discussion above, we know that catastrophes will involve the society in temporary disorder situation. Catastrophes generate needs for commonweal, and the society then replies to these demands through information channels, creating commonweal supplies. On the premise of generating commonweal demands and commonweal supplies, the tasks of all acting subjects in society are to timely reply to the demands with preparations and to accurately deliver the supplies in time, to realize the timely and effective joint of the supplies and the demands so that the damage of the catastrophes will be reduced to the lowest.

There are two key factors of achieving the timely response to the demands with
preparations and the timely and accurate delivery of supplies, the smooth channel of information and the smooth channel of resource such as people and property. Only when the information channels are smooth can the commonweal demands be reflected to the society timely and accurately; only when the resource channels are smooth can the commonweal supplies be delivered to the disaster areas accurately and timely. An important way to achieve the smoothness of information channels and resource channels under the condition of catastrophes is to construct a platform for information communication and resource allocation coordinate with actions. Building this unobstructed platform needs the cooperation of all rescuing parts and individual actions can hardly deal with the complicated situation. Therefore, all the participants need to join up, supply each other's demands, complement each other's strength and weakness, learn from each other and cope with it together.

As shown in Fig. 5, when the disaster happens, a huge demand for commonweal generates in disaster areas, and then the society responds to them, so a huge supply of commonweal generates. There are all kinds of commonweal demands (various graphs in different shapes are used to represent the diversity of demands in the figure) and commonweal supplies also need to correspond to them. And all the key actors should act on the coordination platform. On one hand, the coordination platform is needed to construct smooth information channels to reflect commonweal demands. On the other hand, it's needed to deliver commonweal supplies.
The solution of the conflicts between the supply and demand of commonweal under the condition of catastrophes: All main bodies of act cooperate seamlessly

The catastrophe rescue is strictly restrained by time, under which situation the effects for every action subject to act alone is quite limited. In other words, to a certain extent, the eager interdependence appears among each action subject, including the dependence and cooperation among each internal department and hierarchical levels of government system, including the dependence and cooperation among each enterprise of internal market and the NGOs of the third sector, and including the dependence and cooperation among the government, enterprises and the NGOs.

Therefore, in case of catastrophe, cooperation among all action subjects becomes so important. The next key question is how will these action subjects cooperate with each other? The ideal situation is that acting subjects cooperate seamlessly with each other. The seamless cooperation means that the government, enterprises and NGO timely and accurately provide public goods and service through mutual cooperation based on the social needs under the catastrophe. The seamless cooperation requires for strict conditions and limitations. It needs a unified acting stage, where acting subjects could share all resources and information with each other. Thus, it requires for sufficient rationality, sufficient information and sufficient resources. While in reality, these conditions are hard to be fulfilled. Therefore, the seamless cooperation is a process that approaches infinitely but never to the end. Especially under the strict time restriction during the disaster, these are even harder to reach. It should be noted that this doesn't mean unable or unnecessary to cooperate just because it's difficult to cooperate seamlessly. On the contrary, it’s intended to mention that each action subject should aim to cooperate seamlessly through sharing information and resources with each other, because it's difficult to realize the seamless cooperation. Therefore, in reality, it's more rational for each action subject to cooperate under different levels and positions, restrained under rigor conditions. It can be showed in the following pictures:
Firstly, each department and hierarchical level within government system should work closely. At this point, Chinese did a good job. The internal system of Chinese government could promptly unify together at the wake of the disaster. It is worth praising that Chinese government acts so fast and strongly at the aspect of the disaster assistance and response. The main disaster response bodies of the Chinese government system are: Disaster Reduction Committee, Emergency Office, Disaster rescue Command Center, Ministry of Civil Affairs, Military, etc.

Secondly, there shall be cooperation among NGOs. When catastrophe happens, the social demand is complicated, so the disaster rescue needs various supports of manpower, financial resources, material resources and information, etc. However, if we want to get adequate support, it is necessary for NGOs to cooperate with each other in order to achieve complementary advantages; in order to achieve cooperation, a common action platform is needed, on which the NGOs share information and resources thus to effectively participate in the disaster rescue process.

For example, in the Wenchuan Earthquake, some NGOs having different scales and functions have emerged to effectively participate in the rescue activity. Except the large-scale and close unions such as 5.12 Nongovernmental Rescue Service Centre and NGO Sichuan Rescue United Office, there were also some unions based on regions, such as Shanghai
Xintuofeng Action Group, Guizhou Nongovernmental Earthquake rescue Work Combined Action, Shaanxi Ten NGO Combined Action, and also unions in the form of project cooperation such as NPI Incubator, Nandu Fund and so on. There was also a loose confederation of China Nongovernmental Disaster Reliving Organizations of advocacy nature, characterized by publishing combined action announcements.

As mentioned before, in China, there exist various forms of communication and cooperation among many NGOs. However, on the whole, the range of cooperation is relatively narrow, the cooperation level is relatively low, and the scale is relatively small. For example, there had insufficient 5.12 rescue service center and NGO Sichuan united rescue office. At ordinary times, NGOs pay attention to their own professional fields. Restricted by the factors such as system and physical space, the communication cost is high, so their daily communications are relatively few. Therefore, when confronting the catastrophe, each NGO can neither act with a clear objective nor instantly come together to integrate resources, thus failing to give a full play of the NGO's function in earthquake rescue.

Thirdly, cooperation between government and NGO should be strengthened. In the process of catastrophe rescues, the government is the dominant while the NGOs are indispensable auxiliary powers. They each have their own advantages, so the cooperation between them is needed to realize the complementary advantages. This is further confirmed in our interview that the NGOs have a strong desire to cooperate with the government while the civil affairs departments also have the strong desire to collaborate with the NGOs. However, in China's disaster rescue system, this aspect is still a weak link at present. This situation is related to the system environment and development of the NGOs. On the one hand, the double management system creates certain estrangements between NGO and the government. The separation of the competent business unit and registered agency cuts off the communicative channel between many NGOs and government, thus the cooperation becomes impossible. On the other hand, NGO has not been widely understood and accepted while the government is not fully experienced in cooperation with it. Therefore, there is still a rather long way to go for their cooperation.

The fourth, government, enterprises, NGOs and other acting subjects should all cooperate with each other. What's more, under the condition of catastrophe, among the government and
enterprises, enterprises and NGOs and within the enterprises themselves can cooperate
together to realize sharing information and resources. Such as the Zundao Volunteer
Coordination Office appeared in the rescue process of Wenchuan Earthquake, which was a
good try of the cooperation of the government, enterprises, NGO, and other social forces.

In conclusion, under the circumstance of catastrophe, every action subject needs to
cooperate in time so that they will exploit effectively their advantages to the full in all regions
and do better in participating in the disaster rescue. In reality, rational cooperation includes
the cooperation among different administrative levels and sectors within the government,
among different NGOs, among different enterprises, between the government and NGOs,
between the government and enterprises, between NGOs and enterprises and among the
government, enterprises and NGOs, etc. The forms of cooperation are diversified. They can
be bilateral and multilateral. Subjects can participate in cooperation in the name of individual
or even in the name of combo.

[References]

Mechanism of Multiple Participators in the Crisis Management Chinese Public
Administration, 2004.07


Work, paper presented at the the 17th Annual International Philanthropy Fellows
in Philanthropy & Social Justice International Conference, July 11th- 14th, 2005,
Beijing.

Practical Framework for Studying and Strengthening the Collaborative

[7] Salamon, L.M. Rethinking Public Management: Third-Party Government and the


