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The Game Model with Emotional Factors of Public and Media in Public Emergencies Management Engineering

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Abstract

The current researches on the game behavior between the media and the public in emergency management engineering are limited to the traditional expected utility theory, the theory suppose the both sides are rational people, so the theory researches often do not match the reality. This paper introduces emotional factors and makes a new study on the game model. At first, according to the analysis of the relations between the public and the media in emergencies, we begin to study the impacts of emotions on the game behavior, and then set up the RDEU game model Based on emotional function; At last, it takes a Nash Equilibrium dynamic evolution modeling analysis by numerical example.

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Keywords: Emergency Management Engineering; Emotional Function; Game Model; Nash Equilibrium.

1. Introduction

The public emergencies management is the key of the emergency management engineering. Public emergencies happen suddenly, it is likely to cause significant casualties, property losses, ecological environmental damages and serious social problems, finally endanger public safety [1]. In recent years, the worldwide public emergencies occur frequently; these incidents threat the public's life and property safety directly, and they become the important factors, influencing Chinese social stability and modernization. Media is the main channel for general public to receive information, their reports of these incidents will directly influence the general public's behavior and response attitudes, so it is a very meaningful work to research the decision-making behavior of media and public in public emergencies engineering.

In the modern society, the domestic and foreign researches on the emergency management engineering are increasing. In the study of public emergency management engineering, JingYang, Jianming Chen (2005)[2] thought that it's suitable to suppose that the whole respond process to emergencies is a dynamic gambling process between two players of "decision maker" and "emergency" itself. And they put forward a set of thoughts and methods to classify the emergency incidents dynamically from the viewpoint of system. In the application of game theory, based on a single step, normal form game model and the Nash equilibrium, Nagarajan, Rang Nathan (2007)[3] proposed a emergency management system; Darin Goldstein (2008)[4] used the method of game theory to study the

emergency vehicle path model, and confirmed the new Nash equilibrium was the best through the simulation.

In the applications of game theory in emergency management engineering, Yaping Si (2008)[5] used the game theory to analyze the government's different behaviors and attitudes to the relevant individuals, organizations and other interested groups involved in the process of public crisis management. DeHai Liu (2010)[6] built a game equilibrium evolutionary model considering the mental models that reflect cognition structure different among grass-roots, higher-lever government and social vulnerable group in the emergency management engineering.

At present, there are few studies about the participants in the public emergency management engineering, and the existing literatures do not take emotional factors into account. They lack of in-depth analysis of each player's risk preferences and the actions they taken. This paper introduces emotional factors and makes a new study on the game model. At first, according to the relations between the public and the media in emergencies, we study the impacts of emotions on the game behavior, and then set up the RDEU game model based on emotional function.

2. The research of game relations between media and public in public emergency management engineering

2.1. Stakeholders involved in public emergency management engineering

Public emergency management is a game process, which involves two or more player's interaction. In recent years, the domestic and foreign researches on various stakeholders involved in public emergency management are relatively rare, and they lacks of in-depth study and system discussion. We take emergency management as the title, search the CNKI database carefully, finally found 144 journal articles related participation body. And among them, the type and the number of participation body referred are different. So we use the method of literature metrology and system engineering to statistics the involved participation body in emergency management. Next, we select the ones whose proportion of number is more than 50% as the main stakeholders. They are: the public, government, non-governmental organizations, and mass media.

Table1. The literature number in each year

year	Literature number
2011	22
2010	42
2009	27
2008	26
2007and before	27

Table 2 .The proportion of each participant

	Literature number	The proportion
The public	121	84%
government	140	97.2%
non-governmental organizations	70	50%
Profit organizations	22	15.3%
Mass media	96	66.7%

2.2. Game relations between the media and public in public emergency management engineering

The public emergencies has enormous destructive, so it is bound to harm the people's lives and property, and bring people a considerable impact and pressure and make most people are in strong impulse. Therefore, the public need to receive a variety of information. Media and Public need to go all out to make the society return to normal and avoid the spread of negative emotions. But sometimes, in order to convert the news' value to the interests, some reports of the media may hide some information according to government's needs, which may help us to reduce the spread of the panic, but may also cause rumors. The media will sometimes deviate from the true conditions or over-reported, which would aggravate the panic among people. When the mass media can't satisfy the strong information needs of people, various other forms of non-mass media may be step on, thus aggravating the spread of false news and creating social panic. This creates a game between media and ordinary people.

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