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The Routine and Emergency Coordinated Management of Public Security

Abstract The paper presents a study based on the observation of public security programme situations. Nowadays, public security management is faced with challenges such as the increase in non-traditional safety threats, high occurrence probability, obvious complex chain reactions, high security demand, vulnerable bearing systems and world-wide influences. For the new adapted requirements of public security management, this paper puts forward the concept of the coordinated routine and emergency management, which combines the routine management at normal status and the emergency management at the abnormal status based on the whole process of public security management. This paper analyzes the coordinated management system and establishes the decision-making objectives, decision-making model and constraints. In addition, this paper proposes the basic strategy of achieving the coordinated management of public security.

Keywords: public security, routine management, emergency management, coordinated management

Public security is closely related to human survival, life continuity, and society and development. Not only is it one of the most basic requirements, but it is also the basis for ensuring the normal operation of the social economy and life order. Currently, public security issues and emergencies include natural disasters, accidents, public health incidents and public security incidents, which are becoming increasingly more varied, more frequent and riskier. When the traditional and non-traditional, natural and social risks coexist, it is very easy to end up with an out-of-order and paralyzed social system. Crisis and risk is unprecedented, uncertain and unpredictable, so a fast, safe and efficient response is required. At the same time, more adapted public security management strategies should be

studied. The studies on regional comprehensive management, multi-coordination management, integrated management, and other advanced management approaches and methods (He & Li, 2012; Shi, Liu, & Xu, 2006; Yang, Li, & Zhang, 2012; Zhang, 2003; Zhang, 2005; Zhang & Wei, 2009; Zhang, Okada, & Tatano, 2006) have enriched the theory and promoted the practice of public security management. However, public security management incidents involve both routine and emergency response management stages during the whole process of incident propagation, break out, development, handling and post-disaster handling. Modern societies have to consider both stages and construct more profitable management strategic conditions and basis to improve the management capability. In this study, the theory of routine and emergency coordinated management is presented, the conceptual model is discussed, and the strategy to promote the coordinated management is proposed.

1 The observation and enlightenment of public security management

1.1 The circumstances of public security

Public security requirements are constantly changing and improving. With the development and progress of society, public security management has gradually evolved in several perspectives (1) from the early stage which is mainly responding to natural disasters to the current situation of responding to threats which influence the whole social security, (2) from the emphasis on property, social security to the emphasis on the “people,” (3) from ignoring the natural environmental damage to the ecological civilization construction. Nowadays, in addition to the traditional security threats, non-traditional security factors, complex disaster systems, increased disaster frequency, raised security standards, and other complex challenges also need to be considered.

(1) Non-traditional security (NTS) threats increased
NTS, also known as new-security threats (NST), is defined to differentiate with the traditional security threats,

Manuscript received July 30, 2015; accepted November 2, 2015

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indicating the elements which threaten the survival and development of sovereign states and the human beings in general other than military, political and diplomatic conflicts (Lu, 2003; Yu, 2007). Among many examples are economic security, financial security, information security, ecological, and environmental security, water security and terrorism. Under the shadow of globalization, non-traditional security problems have increased significantly. The non-traditional security issues usually break out in the form of crisis and the consequences will “internally-transfer” or “internationally-spill out” that strongly threaten the public security order.

(2) The increasing frequency of public security incidents

With the backdrop of global climate change, the occurrence probability of extreme weather events and natural disasters has increased (Sun, 2010), thus the risk that the public security faces is also constantly increasing. At the same time, since World War II, the world has experienced a period of over half a century of peaceful development in both developing and developed countries. Economic and social development is in a transitory and growing period and there are many social instability factors. Furthermore, revolution itself is a risk, which introduces some more complex and uncertain factors into the public security situations.

(3) The complex chain reaction of public security incidents

The complex chain reactions of public security incidents are becoming more and more obvious. With the strengthening of personnel connections in different areas, the relevance of natural disasters, accidental disasters, public health incidents and social security incidents and other incidents is becoming obvious. Mutual influence and mutual transformation result in the generation of secondary, derivative events or cause the combine of variety of events. Major natural disasters are often accompanied by secondary disasters, and form a complex disaster chain (Han, Wu, & Wang, 2007). Similarly, social events, such as disasters, public health, and other social events can trigger a new social event, or may cause environmental damage, affect the natural ecology, and even induce natural disasters that in turn endanger human beings.

(4) Raised requirements of public security standards

Requirements of public security standards are continuously raised. With the development of human civilization, scientific and technological progress, economic development, and living standards, the connotation of public security has been deepened and the extension has been expanded. It has gradually become an increasingly important public demand. A security problem is no longer simply about the basic necessities of life, but it also involves the fields of production and ecology. The demand of security and the security standards are expanding and enhancing. At the same time, security problems continue to expand along with social development. The socialization tendency is becoming more noticeable, and complex social

reasons are involved. Furthermore, the traditional meaning of the possible-preventable security issues is becoming increasingly complex and unpredictable. This is forcing people to have more aspirations and requirements about public security and public security programmed management.

(5) The increase of complexity and vulnerability of the bearing system

With economic development and social progress, lifeline systems such as water supply systems, electricity systems, energy systems, transportation systems and communication systems have been developed that are becoming more and more web-based. These increasingly networked, modern, and complex systems have been continuously improved on the comprehensive functions, but the destructive power and damage caused by disasters has also expanded. The security system has become increasingly fragile. Once a certain link has a problem, it is likely to lead to a series of crises, such as economic loss and life hardships, some places become partially or temporarily paralyzed, even affecting entire regions (Zhang, 2008; Liu & Zhou, 2007).

(6) Internationalized public security incidents

In public security incidents the trend has been of internationalization. Economic globalization has brought unprecedented opportunities for strengthening international cooperation and promoting joint development. However, it has also made the security of the economy, finance, information, and other aspects break out of the traditional national concept. A lot of security problem platforms have been upgraded to the international level. Terrorist attacks, partial wars, financial crises, and the fight over water resources, oil resources, the spread of a major transnational epidemic and other emergencies occur from time to time with two or more countries being involved. At present, the response to public security incidents is changing from national disaster reduction to global and regional joint disaster reduction (Liu, 2014).

1.2 The view of public security programmed management

(1) Adapt to “people-oriented”

Public security programmed management should adapt to the concept of “people-oriented.” Public management, in a certain sense, is the management of people. Both the subject and object of the management is people. The aim of public security management is to protect people and to promote the development of people. Public security programmed management needs to place public life security as its first priority. After the occurrence of public security incidents, we must always put the protection of life safety as the core of public security programmed management. In the management process, the security of administration should also be noticed; self-protection and logistics support should be done properly in order to prevent new casualties and property loss. Economic and social development has to build on the basis of con-

tinuously enhanced public security ability, which has also to guarantee the needs and the self-development of the public. In this way, the public can enjoy the outcomes of economic development and social progress.

(2) Adapt to economic social development

Public security programmed management should adapt to economic social development. In other words, public security programmed management must fit into the socio-economic base, which can better safeguard the economic and social environment, and in turn promote its development. The development of public security programmed management should also take the initiative to adapt to socio-economic development. The technology, equipment, and personnel of public security programmed management are all drawn from society, and the promotion of its own management ability cannot be separated from the social economy, the progress of science and technology, and the improvement of the basic quality of citizens. In fact, once the public security incident occurs, it is always related to the specific economic, political, and cultural environment which in turn impacts on the social development. For a stable, timely and effective solution to the security problem, public security programmed management should consider the existing economic and social conditions, and adopt effective measures to reduce the impact and damage.

(3) Adapt to the ecological civilization construction

Public security programmed management should adapt to ecological civilization construction. Promoting ecological civilization construction is an urgent need for the sustainable and healthy development of the economy. Furthermore, it is chosen way to achieve the “Chinese dream” and the inevitable way to deal with global climate change. The overall layout of “Five-in-one” socialism with Chinese characteristics has placed the construction of an ecological civilization in a prominent position over the others which include economic construction, political construction, cultural construction, social construction. Ecological civilization construction is the foundation and condition of the fifth aspect and is also the conduit of the other four aspects and infiltrates them. Therefore, the concept, viewpoint and method of ecological civilization are indispensable and have to be integrated into the other construction processes. Public security programmed management is an important part of social construction, so the concept of ecological civilization construction must be integrated into the process of public security programmed management to meet the needs of ecological civilization construction.

(4) Adapt to the legal system of the society

Public security programmed management should adapt to the society with rule of law construction. Public security programmed management is a kind of administrative act and administrating according to law is the foundation to building a society with rule of law. Therefore, the public security programmed management behavior should be based on the relevant laws and regulations, which would

help to ensure the legitimacy and efficiency of the treatment measures. When public security programmed management organizations are dealing with the incidents, from the legal aspect, source of power, content, exercise program, the restrictions on civil rights, and relief and social supervision are usually included. Bringing public security programmed management into the rule of law system can adjust various social relations more effectively during emergency situation. In those cases, the public interest can be protected more effectively, and the authority of public security programmed management can be controlled to ensure service based on social needs and public will (Zhu & Zhang, 2006).

(5) Adapt to the construction of innovation-oriented country

Public security programmed management should adapt to the construction of innovation-oriented countries. Innovation-oriented countries construction is related to many aspects of public security programmed management. The innovative strategy of the country not only requires effective public security programmed management service, but public security programmed management itself also needs new technology, new equipment and new methods. Public security programmed management is supposed to service the national implementation of the innovative development strategy; any absence or mistake is not allowed at any time. Similarly, the innovation promotion conferred to public security programmed management from scientific and technological innovation is not a one-time occurrence; it cannot be done “once and for all.” It needs to adapt to the requirements of the construction of innovation-oriented country by closely following the passage of time and the changes of situations (Liu, 2014).

2 The coordinated routine management and emergency management for public security

2.1 The cognition of modern public security programmed management

With the development of economic societies, the public security situation is becoming more and more complex, and the public security programmed management is being confronted with more severe challenges. Although there is much mature and advanced experience and practice that could be followed domestically and internationally, there is still a long way to go to explore a modern public security programmed management strategy. It is challenging to propose the management strategy which has high adaptability and combines all standard management concepts such as decision-making management, unified management, multi-objective management, and risk management as well as other scientific management methods.

Studying public security programmed management from the perspective of modern management science needs to

exceed emergency management itself. Separating public safety events from routine public management of the whole society aspect would be more effective. Public security programmed management supports the response to public security incident, to provide a good preventative approach and responsive actions. At the same time, it needs to pay attention to the emergency response management as well as focus on the routine management both before or after of the public security incidents. There is a close dialectical unity relationship between routine and emergency management, although there are differences between the routine and emergency situations. Coordinated management thought of these two aspects has existed for a long time and has been applied to the management practice (Liu, 2013). Thus, in the field of public security programmed management, the coordinated public security routine management and emergency management is becoming a trend under the conceptual guidance of “unified normal and abnormal disaster relief.”

2.2 The concept of coordinated management

Coordinated public security routine and emergency management is based on normal and abnormal fields of vision. The concept of coordinated management is to face the whole incident development process with overall consideration of routine and emergency situations. The aim of the coordinated management is to maintain system sustainable operation, to reduce the operation risk, to deal with the emergency and to achieve system development. It involves a series of planning, organizational, command, coordination and control behaviors that can meet the actual or potential requirements for management.

The routine and emergency coordinated management is not the simple superposition of routine management on emergency management, but an associated combination of rational control processes and efficient risk reduction mechanisms from the perspective of systematic management. When the goal and direction of the system development are determined, the aim with optimized system operation and maximized benefits can be achieved through the cooperation of interests and costs of routine management and emergency management. According to the dialectical relationship between routine and emergency status interpreted in reference (Liu, 2013), it can be seen that routine management and emergency management are the two different ways that people deal with the process of a certain incident. They have connections but also differences. It is more likely an inter-grown relationship and in certain conditions, they are complementary to each other evolving in an integrated way.

2.3 Analysis of coordinated management

Coordinated management itself is a complex system involving natural and social factors. This means the

management process needs to serve more than one objective and also consider the interests of each side to perform the management and make decisions. For more scientific and efficient implementation of the coordinated management, the constitution of coordinated management needs to be analyzed, the characteristics and key links need to be mastered, the goals should be set up reasonably, the constraints need to be analyzed, and the management efficiency can hence be improved.

The following formula can be used to describe the constitution of coordinated management:

$$C_0 \sim A \ni \cap \{a_i\} \quad (i = 1, 2) \quad (1)$$

where C_0 is coordinated management; A is the corresponding system scope of each field and level management; a_i is the simple routine or emergency management; $\{a_i\}$ is the combination of routine and emergency management; \cap is the generalized correlativity of system management and the combination of routine and emergency management; \sim is the actual situation which needs to be discussed (Liu, 2006a, 2010). *Figure 1* shows the constitution and the extension of coordinated management.

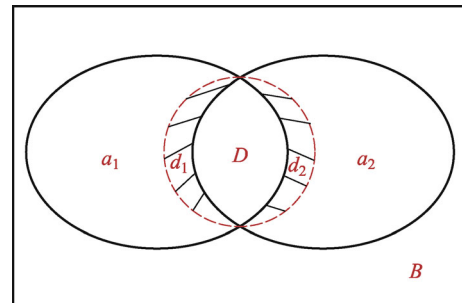


Figure 1. The constitution and extension of coordinated management. a_1 is routine management, a_2 is emergency management, D is the intersection of a_1 and a_2 , that is the common area of routine management and emergency management in a certain range, which is a direct part of the coordinated management; B is the extension part of routine, emergency and coordinated management. Note that D is not fixed, but dynamically changes with the boundary conditions of a_1 and a_2 , d_1 and d_2 are the extended area. The area excluded in intersection D could also be dynamically included in the intersection part in a certain condition. This part needs to be highly concerned and there may be an indirect coordinated management procedure, or put it into the relevant preparation part at any time or in advance.

2.4 Coordinated management decision-making

(1) Decision-making problem

As coordinated management is a complex system, there are many contradictions and conflicts in the process of making decisions when coordinating routine and emergency management. Different emergencies have different

locations, durations, and there are differences in the cognition and demands of different interest groups. Therefore, coordinated management is a multi-level, multi-objective group decision-making issue. The mathematical expression of multi-objective decision-making process of routine and emergency coordinated management is described as follows:

$$\text{Max}(\text{Min})Z = \{f_1(x), \dots, f_2(x), \dots, f_n(x)\}^T \quad x \in X \quad (2)$$

where, x represents the management decision variable; X represents the feasible region of the management decision variable; $f_i(x)$ represents the single objective function with x as the variable; Z represents the comprehensive value of multiple management decision objectives.

The solution to this kind of multi-objective optimization decision problem may not be one and only one, but rather a non-inferior solution set including multiple solutions. Theoretically, finding out the optimal solution for each single objective can solve all of the multi-objective problems.

$$\text{Max}V(Z) \quad Z \in Q \quad (3)$$

where, $V(Z)$ represents the utility function with Z as a variable, which reflects the preference of the decision maker in the non-inferior solution set. To obtain the reasonable decision, the utility is usually quantitative. Target value is usually used to describe the utility, and the higher the target value, the greater the utility.

(2) Decision-making model

Coordinated management system is a complex system with multiple levels and multiple objectives, and it requires a multi-level, multi-objective decision. The coordinated management target for examining public security field can be divided into three levels: the first is the safety of human life, the second is the safety requirement for property, society, the environment and so on, and the third is the efficiency and benefits of management. For a single target, a quantitative description can be carried out in accordance with the following method.

According to the basic needs of the public security programmed management, whether it is routine management, emergency management, or coordinated management, minimizing human life damage is the basic goal. The target function of corresponding minimum loss of life can be described as:

$$\text{Min}f_1(k) = \sum_{m=1}^M \sum_{u=1}^U \sum_{k=1}^K \text{QLL}(m,u,k) \quad (4)$$

where, $\text{Min}f_1(k)$ is the minimum number of casualties caused by k event; $\text{QLL}(m,u,k)$ is the number of deaths and injuries caused by k event at m time frame in u area; M indicates the time duration; U indicates the area number; K indicates the number of event types. By this analogy, minimum property damage function:

$$\text{Min}f_2(k) = \sum_{m=1}^M \sum_{u=1}^U \sum_{k=1}^K \text{QPL}(m,u,k) \quad (5)$$

minimum environmental influence function:

$$\text{Min}f_3(k) = \sum_{m=1}^M \sum_{u=1}^U \sum_{k=1}^K \text{QEL}(m,u,k) \quad (6)$$

minimum societal influence function:

$$\text{Min}f_4(k) = \sum_{m=1}^M \sum_{u=1}^U \sum_{k=1}^K \text{QSL}(m,u,k) \quad (7)$$

maximum efficiency and benefits function:

$$\text{Min}f_5(k) = \sum_{m=1}^M \sum_{u=1}^U \sum_{k=1}^K \text{QEE}(m,u,k) \quad (8)$$

where $\text{Min}f_2(k)$, $\text{Min}f_3(k)$, $\text{Min}f_4(k)$, $\text{Max}f_5(k)$ indicates the minimum property damage value, minimum environmental influence value, minimum societal influence value, maximum efficiency and benefits value respectively caused by the k event; $\text{QPL}(m,u,k)$, $\text{QEL}(m,u,k)$, $\text{QSL}(m,u,k)$, $\text{QEE}(m,u,k)$ indicates property damage value, environmental influence value, societal influence value, maximum efficiency and benefits value respectively caused by k event at m time frame in u area; other symbols have the same meaning as above.

The multi-objective should be comprehensively considered, and the difference and priority between the targets above need to be further considered. To reflect this difference, priority function is set as:

$$g(m,k) = \begin{cases} 0 & \text{current session with no priority} \\ 1 & \text{current session with priority} \end{cases} \quad (9)$$

where $g(m,k)$ indicates k event priority level at m time frame, 0 indicates no priority at current session; 1 indicates that the current session should be put priority, this function changes with the development of the situation.

Then, multi-level and multi-objective function composed by the above objective functions can be expressed as:

$$\text{Min}G = \sum_{i=1}^4 g(m,k) \text{Min}f_i(k) + [g(m,k) \text{Max}f_5(k)]^{-1} \quad (10)$$

where $\text{Min}G$ indicates the comprehensive target value of public security coordinated management, other symbols have the same meaning as above.

(3) Constraints

The main objects of public security coordinated management are casualties, property, environment, society, and benefits that change with time and location. Therefore, it is necessary to select the appropriate indicators as specified

constraints according to the economic level, the technical ability, natural conditions, social environment and other aspects of the public security management system for building a layered multi-objective decision model.

Economic development constraints

$$a(m,u,k) \geq a_{\max}(m,u,k) \quad (11)$$

where, $a(m,u,k)$ indicates the economic development level that k event corresponded to in m time frame and u area; $a_{\max}(m,u,k)$ indicates the highest level of economic development that k event corresponded to in m time frame and u area, and by this analogy, technical capacity constraints:

$$\beta(m,u,k) \leq \beta_{\max}(m,u,k) \quad (12)$$

natural condition constraints:

$$\lambda(m,u,k) \leq \lambda_{\max}(m,u,k) \quad (13)$$

cost and benefits constraint:

$$\theta_{\min}(m,u,k) \leq \theta(m,u,k) \leq \theta_{\max}(m,u,k) \quad (14)$$

where $\beta(m,u,k)$, $\lambda(m,u,k)$, $\theta(m,u,k)$ respectively indicate the highest technique level, the largest natural condition constraint, and the highest and lowest management efficiency or benefits that k event corresponded to in m time frame and u area (Liu, 2006, 2006b, 2006c).

3 The strategy of public security programmed management

3.1 The laws and regulations based on the coordinated management concept

Public security programmed management cannot be performed without authorization and standardization from laws and regulations. The key point is to provide a legal basis for the public security programmed management behaviors of government departments and other relevant institutions. This legal basis should include the basic laws which involve public security, specific laws, and emergency plan systems and so on. According to the requirement of public security programmed management, laws and regulations are important contents of public security routine management construction. The idea of routine and emergency coordinated management should be considered at the legislative stage. Thus, the laws, regulations and emergency plans can prevent disaster in the routine state and can mitigate disaster when emergencies happen. A system including legislation, enforcement and dissemination of the law is proposed, in which emergency management can reflect routine management, and routine management collaborates with emergency management.

3.2 Management system concept design based on coordinated management demand

Routine and emergency coordinated management is a complex multi-level, multi-dimensional system, which requires the combined interaction of the government agencies, domestic non-governmental organizations, and international organizations. An efficient collaboration mechanism is very important to deal with problems in this complex system. First of all, the responsibility of all levels of government agencies should be clarified during the process of public security programmed management. Each department or agency should understand their own role in public security affairs to avoid inefficient or unscrupulous consequences because of unordered action. Secondly, the coordination between government agencies and non-governmental organizations needs to be improved. The work of government in public security programmed management should be completed. In addition, the cooperation between domestic and foreign organizations should be strengthened, and we should actively participate in international public security affairs.

3.3 Operation system framework should adapt to coordinated management practice

Government is the main body of public security programmed management. An operation mechanism needs to be built accordingly which can adapt to routine and emergency coordinated management. First of all, a "horizontal mechanism" should be established as the work mechanism operating between same level government agencies. It is an information network to exchange and share resources and technology that strengthens the joint mechanism. Secondly, improve the "vertical mechanism" that is working on the mechanism in the same system but on different levels of the organizations. This should be done by optimizing the personnel, goods and equipment supplies in different departments, by strengthening information and resource exchange, and by guaranteeing clear management communication, reducing operational links and administrative costs. All these will improve the efficiency of emergency response.

3.4 Key point of technology information support system reflecting the attribute of coordinated management

Information sharing is the basis and the media of routine and emergency coordinated management. It is an essential requirement to build a high-efficiency basic information support system for coordinated management. Specifically, basic scientific research and technology development of public security information should be improved for the reasonable planning of the information network system. It is important to complete the information integrated

management platform to meet the requirements of joining, integrating, interconnection, information sharing and decision-making support for this multi-system approach. It is also important to apply comprehensive and systematic information service for public security coordinated management.

3.5 Programmed and non-programmed system construction of coordinated management

Programmed and non-programmed system construction is a powerful measure to achieve the goal of public security routine and emergency coordinated management. Reasonable layout and appropriate operation programmed and non-programmed systems are very important for public security. First, the basic concept of public security routine and emergency coordinated management is applied in the planning of infrastructure construction according to regional public security situation and characteristics to reasonably optimize the engineering layout. Secondly, the requirements of coordinated management should be applied throughout all aspects of the safe operation process of engineering and non-engineering systems. Moreover, it is necessary to positively strengthen disaster prevention and reduction ability construction.

3.6 The setting of coordinated management resources deposition and collocation system

Human resources, material and financial resources are the guarantee of the public security routine and emergency coordinated management. They are also the main contents of the coordinated management resources deposition and collocation. First, the specialized personnel construction needs to be positively improved, and the managing level and ability should be enhanced. Secondly, the construction of the public security material deposition and collocation system should be improved. A high-efficiency, trans-department, trans-regional, and trans-industry emergency response material cooperation guarantee system should be established with an early warning and information sharing mechanism. Again, a reliable public security funding mechanism should be established by setting up an advanced central and local emergency management funds investment and payment system, increasing the funds usage efficiency, guiding private capital to participate in public security programmed management, and opening up more diverse management fund raising channels.

4 Conclusions

The routine and emergency coordinated management of public security programmes follows the idea of “unified the normal state disaster reduction and abnormal state disaster reduction.” It is trying to adapt to the current economic and

social development as well as to public security situations. Routine and emergency coordinated management is a meaningful exploration of the approach for the development of future public security management.

The strategies proposed in this paper are based on the primary stage conception, which is aimed at exploring the feasibility and operability of routine and emergency coordinated management for public security management. Innovation and practice from the academic and management departments is needed to establish a better and more operational management approach.

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