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Urban Diagnosis and Integrated Disaster Risk Management

Abstract:

The need for integrated disaster risk management (IDRiM) as a novel perspective for dealing with 21st century disaster prevention in both Japan, China and the world is addressed. When cities are focused, the methodological leverage of "urban diagnosis"linked with IDRiM is very effective. A prototype scheme of risk management (RM) is explained, and an extended version of RM for disaster management proposed. This is followed by our premise that this type of risk management inevitably calls for an"integrated"approach, and its rationale is examined. A definition of urban diagnosis is provided and its prospective role in disaster management in this 21st century is discussed. In conclusion the need to examine meta-level conditions for IDRiM development such as"the culture and climate for IDRiM"and documenting the"process technology"of implementing IDRiM in real-world practice are addressed.

Keywords: disaster prevention, integrated disaster risk management, novel public management, urban diagnosis, implementation technology

1. Introduction

The 21st century is seeing a turning point in disaster prevention. There is an emerging trend in disaster management to include the perspective and methodology of risk management coupled with urban diagnosis, all driven by the novel tide of the times, and marked by what may be called "novel public management." For instance, evidences are already available on the emerging role of NGOs in civil society, increasing significance of government-private sector partnerships, and the extending spectrum of social services in both need and provision. Tentatively let this new trend in disaster management be referred to as a "novel public disaster management."

In Japan as well as in North America and Western Europe this novel public disaster management is already in operation and expanding year by year. Due to the different socio-cultural contexts of countries and regions, this trend is not yet visible and clear in other Asian countries such as China but the direction of such a change and its driving force are everywhere persistent

and therefore unavoidable. This provides a sound rationale for incorporating in disaster prevention the new perspective of integrated disaster risk management (IDRiM). In addition there are many other reasons for introducing IDRiM, which are elaborated on here.

2. What is Risk Management?

(1) The prototype risk management scheme discussed by Okada (1986 and 1988) is shown in Fig. 1. The key is the clear distinction made between the ideas of "danger" and "damage." The first trigger event in the occurrence of danger is called "peril" and surrounding factors that may either promote or inhibit subsequent events that may be triggered by the peril are referred to as "hazards." Damage, loss or impact, if caused, is the final outcome. In the following we simply use the term "loss," to mean damage or impact also (see Fig. 1).

(2) In the intermediate process in which a peril results in loss, "subject agents" are committed to take an action and to interact with both the peril and hazards.

"Object agents" also are there that suffer loss. The occurrence of loss therefore can be interpreted as the outcome of subject agents taking "actions" and interacting with both the peril and hazards, and eventually attacking respective object agents. Note that subject agents (SA) and object agents (OA) are clearly identifiable; SA have the capacity to act, and take responsibility for the inherent results. OA suffer loss. If OA are expected to have the capacity to accept (a part of) the loss and also responsible for action-taking (decision-making) in one way or another, OA also become SA.

(3) The conventional model for this prototype risk management scheme is the "private management" one characterized by the equivalence of both subject and object agents. This basic model operates on the "principle of self-responsibility." In contrast the "public management model" assumes a society, community or region consisting of multiple agents, and most commonly, a government or an entity of public interest. In this model the subject and object agents may not always be identical. Some agents are governmental (public sector), non-governmental (e.g., private sector NGOs or citizens and individuals.) Moreover SA and OA are not always a priori identifiable and therefore not so self-evident. We need to set up and determine the boundaries for those "stakeholders" belonging to their communication platforms. As explained later, this is part of the reason why a participatory approach is needed.

(4) Another key concept that intrinsically characterizes risk management is the presence of "unknowns" and "uncertainties" (non-deterministic factors) inherent in the occurrences of the peril, hazards and loss. The use of the theory of probability and a statistical approach is vital in modeling uncertain events. People, however, need to meet the challenges of "unknowns" and of "inexperienced" events which need to be figured out and anticipated with viable ideas and broad imagination, based on the available body of scientific knowledge and accumulated experience to date, with the assistance of tools and media that best support our imagination.

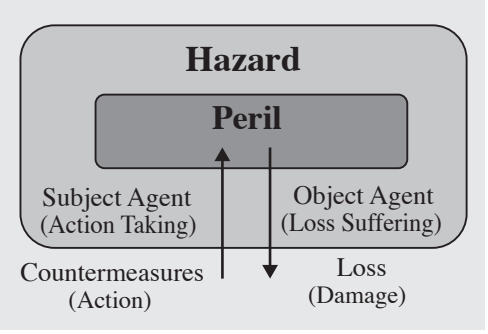

Fig. 1　Prototype for risk management

3. Introduction Of Risk Management To Disaster Management: A Variant Of The Prototype Scheme

As shown in Fig. 2, the essential difference between disaster prevention and the generic form of risk management is that the former is characterized by the concept of a region or city as a common (public) space. Moreover disaster is typified by unwelcome triggering events, and object agents (and their assets and belongings) are characterized by their distribution or concentration in space, and their vulnerabilities in responding to triggered events (Okada, 2002).

Fig. 3 shows a variant of the prototype scheme for risk management (Fig. 1), with well incorporated specifics of disaster management. Note that "peril" in Fig. 1 corresponds to "HAZARD" (with focus on its original meaning of an unavoidable natural hazardous event) in Fig. 2. Likewise "Hazard" in Fig. 1 corresponds either to "exposure" or "vulnerability." Here, "exposure" refers to the "spatial distribution or frequency of an involved object agent exposed to the HAZARD." The term "vulnerability" is the extent to which the object agent (OA) is vulnerable to the forces of the

hazard and the degree of exposure.

This type scheme has the following significance:

i) "Disaster" is differentiated from "HAZARD," the former occurring only when a HAZARD results in the occurrence of the latter, i.e., loss (damage).

ii) "Disaster" is an outcome of risk management in which unknowns and uncertainties are inherent.

iii) "Disaster" is caused and promoted by the degree and pattern of vulnerability and by the exposure of the involved object agents spatially and temporally distributed over a common region, city or local community.

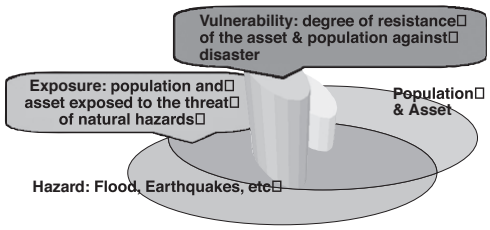

Fig. 2　City Space as Overlaps of Hazard, Exposure and Vulnerability

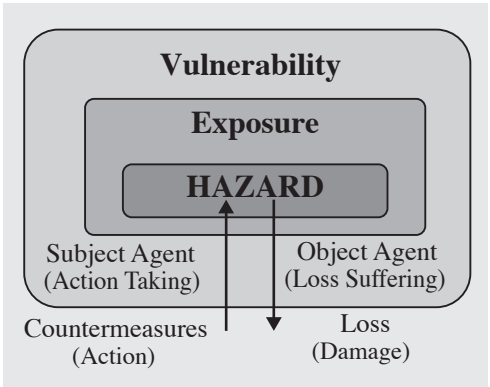

Fig. 3　Variant of prototype scheme for disaster risk management

4. Pre-Disaster Risk Management Vs. Post-Disaster Risk Management

Consider a timeline of risk management that divides itself into pre-disaster (pre-event) and post-disaster (post-event) management. The former is proactive management in anticipation of probable disaster. The latter is retroactive management classified into phases of "immediately after," "in the middle of," and "soon after and in due course of time," respectively corresponding to "emergency management," "crisis management" and "recovery and restoration management." Usually performance of retrospective management largely is constrained by time resources and information available real-time. Decisions therefore have to be immediate and linked directly to its actual practice,

characteristically making them "irreversible." This "irreversibility," as well as "limited short span of time," together with the "scanty amount of information" constrains emergency and crisis management (Okada et al., 2001).

The interrelationship between pre- and post-disaster risk management merits attention. A community's preparedness before disaster and people's familiarization with emergency tools and equipment in everyday life are known to be effective in the event of the need for emergency management. People's cohabitation patterns (a type of exposure characteristic) have been found to be closely linked to the community's search and rescue (SAR) capability as pointed out by Kajitani et al. (2002).

5. Risk Management As A PDCA Cycle

The risk management process should be viewed as a cyclic one as in Fig. 4 showing a common scheme of risk management process as adopted by the EqTAP project (Ye et al. 2002). Alternatively Fig. 5 which shows the schematic process of PDCA (the Plan-Do-Check-Action Cycle) gives the essence of this cyclic process. Importantly, this process is not self-closed within the cycle of planning as information processing; rather this part corresponds to the stages of "identify risk" through "evaluate risk" in Fig. 4. The process is required to extend beyond "planning" to "doing," "checking," and "action," eventually leading back to "establish risk" or "context building" for planning and management.

Greater stress on the proactive approach requires that adaptive management be introduced, allowing for gradual and experimental practices with hypothesized countermeasures and policies to be continually monitored and revised. It also means that the PDCA cycle process must be made in an integrated manner, particularly highlighting to "checking" and "action." As stated later these risk management tasks centered on theses phases of PDCA cycle are called "regional diagnosis;" in particular, "urban diagnosis" with cities as the focus.

The PDCA cycle can be applied also to a chain of both proactive (pre-disaster) and retroactive (post-disaster) risk management. This means that the gap between the two modes of risk management should be filled in and that the phases "CHECK" and "ACTION" on the part of the end-users of disaster management ought to be handed with their initiatives. The idea behind this is stress on the diagnosis of the status-quo based on the practice of "CHECK" and "ACTION" before "PLAN" (Okada, 2002, 2003).

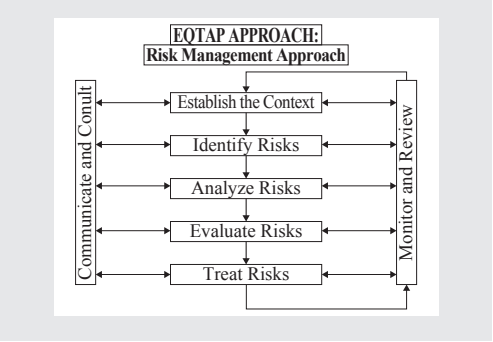

Fig. 4　EqTAP-adopted Risk Management Process

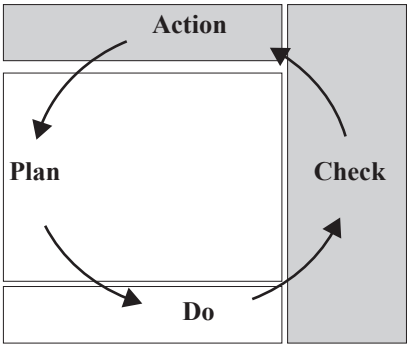

Fig. 5　PDCA Cyclie Process

6. Anticipatory Apprpach Based On The PDCA Cycle Prosess

Suppose that the future outlook is highly uncertain and unknown but that our best knowledge tells us we should (and could) work out and start with a "preparatory countermeasure as a hypothesis." Such being the case, the approach is made systematic by basing risk management on the PDCA Cycle Process. This is called the "anticipatory approach" or "precautionary approach." If this cyclic process intends to induce the evolution of an innovative organizational or socio-cultural scheme, a systematic ecology approach called "adaptive management" may serve well for the purpose. In that case a preparatory countermeasure as a hypothesis is referred to as a "policy" to test empirically (see Fig. 6).

A typical example is the Tonankai twin earthquake disaster that is predicted scientifically to occur with a probability of ca. 0.95 in 50 years in the Pacific metropolises of the Tokai and Nankai Regions of Japan (Okada, 2003). Many governmental initiatives have now been in order to best prepare for this imminent earthquake. We need to meet the challenge of this earthquake risk by an anticipatory approach. A question here is: what policy should be set up as a hypothesis?

Ongoing research challenge focusing on Nagoya City is relatively convincing. So far, the crucial themes identified are (a) how to set up a communication platform for implementation of integrated disaster risk management, (b) which level of government or which type of governance is fit for which type of platform building in terms of geo-space, jurisdiction, and expertise (combined as "decision common space" as to geography, jurisdiction, common knowledge, and technology"), and most important and most difficult, (c) who are able to grow gradually into independent and responsible stakeholders as most of those taking part initially may not necessarily be identical to stakeholders in the real sense of the English language term. This means that the adaptive process of implementing multi-participant decision-making and practices for a variety of disaster risks hypothetically is expected eventually to make participants become stakeholders. This is taken up later in terms of socio-cultural backgrounds and human climate which are considered to override, at meta-level, the communication platform and its practice and process of integrated risk management in a specific form.

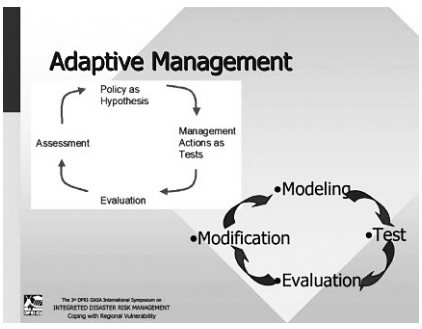

Fig. 6　Process of Adaptive Management

7. Urban Ddiagnosis

A lesson learned from the 1995 Hanshin-Awaji Earthquake Disaster is that we need to change our thinking to manage the kind of low-frequency/ high impact disaster that may hit the heart of a densely populated metropolis. We need to be able to manage such catastrophic risks in a more integrated manner;

i. Disaster management needs to be linked more closely and consistently to urban planning and management.
ii. Disaster management should be extended to include the predisaster phase and the time mode of daily life.
iii. Disaster management is required to

deal with multiple hazards as well as the combined and chained consequences triggered by the occurrence of a single hazard.

iv. Disaster management is not the province solely of the government sector, it must be participated in by the NGOs, private companies, and citizens (particularly residents living in the neighborhood).

Fig. 7 depicts a five-storey pagoda model for viewing a city (region or community) as a vital complex system (Okada, 2002; 2003-1, 2003-2). The top tier corresponds to the "living activity" level, the forth to the "land-use and built-environment" level, the third to "infrastructure," the second to "social environment," and the first (bottom) to "natural environment." With the rise in level, the speed of change increases. Much disaster risk is commonly latent and distributed spatially/temporally across the city. Moreover social hazards may lie in ambush on niches between the different layers in this spatial/temporal system.

In the event of a catastrophic disaster, such spatial/temporal risks will be exposed and in the absence of due awareness of these risks, damage will be more severe than if disaster risks were properly managed. Analogous to the management of health risks to the human body, the methodology of comprehensive examination of spatial/temporal risks can be interpreted as that of the diagnosis of a city as living body. Let us call this methodology "urban diagnosis."

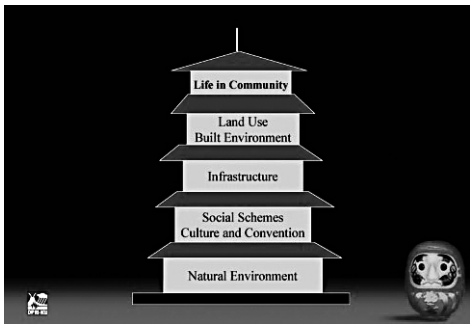

Fig. 7　City as a five-storey vital system (Pagoda Model)

The four items listed above point to the need of conducting urban diagnosis for disaster risk management. Note that principally for urban diagnosis proper place is not so much in "Plan" but in "Do," and, is more in "Check" and "Action" in the PDCA Cyclic Process. This is because we need to monitor and check up status-quo conditions before and after treatment (a countermeasure or policy) has been introduced as a hypothesis. It is important that basically the outputs of urban diagnosis should be open to the public. But this prognosis made starts another round of the PDCA Cyclic Process. A revised prescription and treatment can be developed and selected with "informed consent." The procedure is repeated until a process-tested treatment has been identified empirically and implemented.

8. Socio-Economic Performance Criteria As Measurements In Urban Diafnosis

As stated, urban diagnosis calls for the collaborative work of participants, and thus inevitably necessitating an agreed-upon common measurement with which to make the diagnosis and to determine directives needed for improvement. Let us call such common measurements "socio-economic performance," which implies that they should address the meaning of choices open to them as well as what differences choices would make to societal life, if selected.

The five-year EqTAP Okada section research project has shown that the practice of urban diagnosis requires a variety of socio-economic performance criteria that address the needs and values of different prospective stakeholders. This well may justify the significance of

the model performance criteria developed in our EqTAP research activities and which have relevance to the respective levels of the five storey pagoda model in Fig. 7. For instance the Niche Index primarily addresses the first level (top floor) of the pagoda, and the Topological Index refers to both the third echelon and second one.

9. Disaster Risk Communication As A Prerequisite Of The PDCA Cycle.

The term diagnosis has natural association with a vital system, like that of the human body. It therefore indicates a physiological approach for patients (end-users) who tend to suffer from "disaster risk syndrome." Patients are familiar with and sensible to their problems in situ but may not be at ease with making diagnoses and prescriptions for treatment. Medical doctors (disaster practitioners and experts) tend to lack information and sensors on patient problems in situ, even though they are specialists and thus proficient in making professional diagnoses based on their experience. If they could communicate with patients appropriately and work together in making a "collaborative diagnosis," the result would be good quality risk communication, and a good model for integrated disaster risk management would be realized. This explains why the left column in Fig. 4. is labeled "Communicate and Consult" in the risk management process. Obviously, in practice, the significance and value of introducing the participatory approach rests largely with disaster risk communication in practice. The effectiveness of "informed consent" is another aspect of disaster risk communication to be addressed if we intend to decrease risk of miscommunication and failure to reach a consensus on collaborative disaster management.

10. Novel Public Management And Novel Public Disaster Management (NPDM)

The 21st century is marked by a new trend in public management, which we call "Novel Public Management." The term "novel" intentionally is the adjective used rather than "new" in order to distinguish our approach from what is known as "new public management" initiated by then Prime Minister Margaret Thatcher of the UK. As we posit in our conclusion, any public management, including that of disasters, must have a sound foundation based on culture and climate. Although seemingly the two forms are similar, novel public management has to develop in its own way, so as to be coordinated with culture and climate at meta-level.

So what is particularly novel about "Novel Public Management?" The following are its typical novel features:

a. the emerging role of NGOs (NPOs)
b. innovative schemes of public-private partnership
c. increasing importance of citizen initiatives
d. an institutionalized participatory process for multiple stakeholders
e. public information as common goods and its release to society and stakeholders
f. concerns about public risk and the increasing need for integrated risk management These points show the need for "innovation" in public man

agement for disaster risk; hence the need to develop the methodology for novel disaster management (NPDM), which is required to be built into the framework of, integrated disaster risk management (IDRiM). Equally important is the acquisition, accumulation, and sharing of the knowledge and arts of implementation,

in which how to implement the IDRiM per se needs to be studied and explored as a missing research area of highly practical significance. As clarified in the above discussion, the concept and methodology of urban diagnosis is considered highly consistent with the methodological challenge to accommodate the spirit and directives of NPDM.

11. CONCLUSION

In conclusion, the further research needs are

i) Key relevant policy issues need to be identified and policy linkages developed between urban diagnosis and urban planning and management.

ii) Further insight needs to be gained into meta-levels of integrated disaster risk management, such as the socio-cultural, historical background and processes considered to condition the actual self-revelation of integrated disaster risk management, as well as the entire scope and limits of implementation in a particular area. This overriding (meta-level) condition is termed "the culture and climate for IDRiM."

iii) We need to increase more case areas of implementation, in order to make comparative studies of at least two case study areas, such as the EqTAP project (Okada group) which has compared Japan and China.

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