Emergency Command Systems and Major Earthquake Disasters

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ABSTRACT

This paper addresses the nature and functions of command systems in major sudden impact disasters such as earthquakes. It discusses the bases of emergency command, including the lead agency concept and the support function principle. It reviews various models of co-ordination and control, including the Incident Command System (ICS) and the strategic-tactical-operational approach. With regard to the impact of modern information and communications technology, the paper discusses emergency command processes in relation to how emergency situations are perceived. It goes on to examine popular support for disaster management with respect to how the response to disasters can be democratised, especially with regard to the general transition from military to civilian forms of command. This debate is further developed with respect to overseas humanitarian operations and the transfer of know-how to countries that are in the early stages of developing their civil protection systems. The paper ends by restating the objectives of emergency command and considering possible future trends in this critically important field.

Keywords:
Emergency planning;
Emergency management;
Command and control;
Emergency co-ordination;
Incident command system

1. Introduction

A major shallow-focus earthquake that strikes a densely populated area is likely to result in an archetypal sudden-impact disaster. Survivors must be saved and evacuated from the rubble of collapsed buildings, medical care has to be given to victims, damaged urban environments must be made safe and routeways cleared of blockages [1]. When thousands of people are involved, the sheer scale of the problem requires a robust and efficient system of command. Only by firm co-ordination and effective command will resources be deployed efficiently and effectively [2]. However, draconian measures and excessively authoritarian command-and-control procedures may be counter-productive, and hence the question of how to organise command is both sensitive and complex.

In emergency management terms, co-ordination signifies the process of integrating functions and operations by ensuring that someone is responsible for them and that they are being carried out competently. Command is the act of directing by giving formal orders or instructions to a person or group that is thus commanded to act.

In that part of the twentieth century in which emergency response was dominated by civil defence (roughly 1937-1985), command was essentially based on the traditional military model [3]. This has advantages and drawbacks. On the positive side, responsibilities were clearly distributed according to rank and unit. In negative terms, the model tended to be rigid and authoritarian, and to involve chains of command which could break when key members were absent or otherwise unable to make decisions.

In the sense that it involves directing people and activities, command is always needed in emergency situations. However, there has been considerable evolution in both the social processes and the

technologies involved in disaster management. For example, one of the effects of information and communications technology has been to make the chain of command flatter and less hierarchical. In both military and civilian environments it has shifted the emphasis away from authoritarian command towards a more collaborative form of management and hence a more distributed form of command [4].

The purpose of this paper is to consider the nature of modern command systems in the management of civilian emergencies. The advantages and drawbacks of different models of command will be considered. The place of command systems will be analysed in the context of trends in public administration and civil protection. The paper will also explore some of the implications of emergency command for the efficiency of disaster response and equity in the provision of relief to victims. It will start by examining some of the basic principles that are common to command systems irrespective of country or region.

2. The Basis of Command

This section will consider the underlying principles of command systems. The main purpose of command in civil emergencies is to ensure that resources and tasks are allocated and put to good use in the most efficient and effective way. It should also seek to ensure that needs are properly assessed and tasks are fully covered, without either lacunae or duplication of effort. A good command system guarantees the fair and transparent allocation of responsibilities and ensures that all participants in the emergency operations are aware of their roles and obligations. A commander thus fulfils the classic psychological role of both leader and protector of the personnel under his or her direction [5]. Psychologically, good commanders are neither too detached from situations nor too involved in them, and thus are able to act with coolness and judgement but with an intimate knowledge and full understanding of the needs of the moment [6]. Command also involves monitoring the development of situations, applying plans, protocols and procedures, and collecting and analysing information. However, it can assume different guises according to the history of local and national institutions and the prevailing culture of emergency response.

2.1. Military to Civilian

Modern emergency response has antecedents that go back a considerable distance in time, perhaps to the American Civil War, the nineteenth-century British administration of famines in India, or even to the Middle Ages. However, the first modern agencies designed to protect the public were the civil defence organisations created under the duress of the aerial bombardment of major cities during the 1940*s*. The first of these appears to have been founded at Guernica in 1937 during the Spanish Civil War, the curtain-raiser for the intense aerial bombardments of the Second World War. Thus civil defence came into being, and it developed massively from 1940 onwards. It went on to metamorphose during the Cold War, when the objective was to devise ways of protecting non-combatants against the effects of a thermo-nuclear exchange. Given the all-enveloping nature of the threat, this may have been a futile exercise, but anti-nuclear civil defence grew considerably in many countries, notably in Switzerland, where for decades it effectively involved the whole population.

Civil defence is usually either a military function or a paramilitary one and tends to be organised upon military lines that encompass brigades, discipline and reserved communications. As it involves a real or notional enemy (in origin a foreign power judged to be an aggressor), it is a highly centralised activity directed by the nation state [7].

Although terminology in this field tends to be used rather loosely, and sometimes misleadingly, we can nevertheless distinguish between civil defence and civil protection [8]. The latter came to prominence gradually during the 1970*s* as a reaction to the cumulative effect of natural disasters on the civilian population in terms of mass casualties and the destruction of assets and livelihoods. Civil protection tends to be a decentralised activity: its theatre of operations is always the local area and hence it should involve local administrations and resources. For both political and operational reasons, it tends to work best if it also has the support and involvement of the local population.

As civil defence exists explicitly to protect civilians against aggressions by foreign powers (whether they be states or groups of terrorists), and it therefore can define an enemy, of necessity it tends to utilise a military concept of operations. In recent times this has been complicated by subtleties like 'asymmetric warfare', hidden enemies, the 'enemy within' and other ideas that owe as much to military intelligence as to emergency operations. Nevertheless, the outlook still owes much to traditional military attitudes. In contrast,

once it had broken free from civil defence, which in effect spawned it, civil protection rapidly became demilitarised. It thus also began to shed the military aspects of its command systems [9].

In synthesis, it is possible to chart progress in the management of civilian emergencies from military to non-military approaches, the former by proxy and the latter much more participatory. Indeed, one could argue that the measure of progress in creating systems to manage civilian emergencies is the degree of demilitarisation [10]. However, the resurgence of civil defence in the guise of "homeland security" has complicated the issue by reintroducing a much revitalised form of civil defence with many of the same characteristics of that which civil protection set about replacing [11].

There are distinct differences between military and civilian forms of command. As a result of the demands of warfare, the former tends to be disciplinarian, inviolable and absolute--hence the epithet "command and control". The latter is more flexible and can be achieved by a variety of different models, with differing degrees of discipline and differing divisions of responsibility. In considering general systems it is as well to bear in mind that, regardless of what the overall co-ordination arrangements are, it is possible that fire and police services may be organised on a paramilitary basis, which is a function of the origin of such services. They or other prominent organisations may be the point of reference of the entire emergency response system.

2.2. The Principle of the 'Lead Agency'

Any national system for the management of civilian emergencies requires one or more organisations to take the lead when disaster strikes. This does not imply an absolute rule of command, as the organisation of reference may vary according to the type of disaster (for example, health service authorities may be placed in charge in a pandemic situation, but not during a flood). The "lead agency" is usually the main source of co-ordination on the ground, and perhaps also in emergency operations centres. In the United Kingdom, for example, the lead agency is the police. England and Wales have 43 police forces, and senior members of these usually, although not exclusively, take the lead when emergency operations must be co-ordinated. The police are the UK's lead agency because the prevailing culture tends to regard incidents and disasters as first and foremost a question of public order and safety, which the police are best trained to manage [10].

In Italy the lead agency is the National Fire Brigade Corps, see Figure (1). Here, with the risk of building collapse in earthquakes or inundation by floodwaters, the primary need generated by emergencies is usually one of technical rescue. In Iran, National Disaster Task Force (*NDTF*) under Ministry of Interior is responsible for emergency response and organization such as Red Crescent Society (*RCS*) and military forces are members of *NDTF*. In each country the choice of lead agency depends on culture, regarding what is considered to be the foremost emergency need, and history, in terms of how emergency response institutions have developed and which in the last half century have been the most influential. In each case, the lead agency is a focus for command or co-ordination activities, but there are also many functions that must be organised in order to bring relief to stricken populations.

Figure 1. Fire Brigades' mobile command post, Florence, Italy.

2.3. The Command Function and Support Function Principles

During the aftermath of a disaster a wide variety of services must be offered in emergency mode to victims and survivors. Normal forms of commercial relationship and public administration procedure are not appropriate to the social welfare functions that prevail during the emergency phase. This means that new and temporary forms of organisation must prevail for the duration of the crisis [12].

A wide spectrum of models exists. At one end is the command function principle. This is derived from military practice and divides the flow of co-ordination into levels relative to the scale and nature of operations. Typically, this consists of four levels. The highest is political and ethical and is the

level of major decision making about policy directions. It should not be activated during an emergency but should be present at other times. The next stratum, and the one which usually presides over emergency operations is strategic. This is the level at which major decisions are made and it usually functions as the interface between the emergency response community and the main organs of government, which are charged to provide resources to the emergency effort. The third level is tactical and is the tier at which resources are allocated. Finally, the operational level is the one that deals directly with responding to the emergency. It is presided over directly by operational and tactical commanders and indirectly by strategic ones [13].

The political-ethical-strategic-tactical-operational-results chain can be remembered by the acronym *PESTOR*. It characterises the command function approach, in that decision making, management and operations are organised according to a principle of command and control. In the United Kingdom, strategic command is called "gold", tactical is known as "silver" and operational is termed "bronze". All three emergency services (police, fire and ambulance) may nominate commanders at all three levels, but generally "Police Bronze" commands at the scene of operations, while Silver and Gold are based at police stations in appropriate places.

The opposite end of the spectrum is occupied by the support function principle. According to this, the various activities that must take place during a disaster constitute the main fixed points of the emergency co-ordination structure. They include, communications, logistics, shelter, materials supply, search and rescue, and health services. Hence, strategic, tactical and operational management takes place thematically, according to these various emergency support functions, which have been institutionalised. The idea began in the United States, where in the 1980*s* the Federal Emergency Management instituted 12 support functions (and later increased them to 16) [14]. Other countries have followed suit and have proved that the concept is applicable to unitary states, not merely federal republics where for constitutional reasons the national structures can do no more than support the activities of the member states.

It is clear that many variations are possible by combining different aspects of these two end members of the spectrum. The support function principle relies largely on management and co-ordination, whereas the command function principle is based more on command and control processes. Notwithstanding the advantages of each system, it does not seem possible to produce a "super system" that fully combines the two principles. In command function systems the support functions are distributed between the various levels of command. For instance, in the United Kingdom, many support functions are the responsibility of gold-level management, leaving the other levels--bronze in particular--free to manage the crisis directly. In contrast, under the support function principle, command is evenly spread from one support function to another, which may lead to various parallel systems of command and control that operate simultaneously in the emergency environment. To avoid duplication of effort and ensure full co-ordination without gaps, the Italian system designates the 14^{th} and final support function as the one that co-ordinates the work of all the others.

3. Command Systems

The operational characteristics of a major emergency such as an earthquake disaster require large numbers--perhaps tens or scores--of organisations to work together in a manner that is either unusual with respect to their normal working arrangements or is unprecedented. Emergency procedures and protocols are the systematic methods used to tackle particular problems, such as classification of injuries (triage) or management of dangerous sites (maintenance of cordons). Emergency plans are akin to the score of a symphony orchestra: they are the means by which organisations utilise their procedures and protocols in concert with other agencies that participate in the relief effort. An important part of the emergency response, and a vital basis of the plan that it follows, is the institutional command system [15]. The operational characteristics of a major emergency such as an earthquake disaster require large numbers--perhaps tens or scores--of organisations to work together in a manner that is either unusual with respect to their normal working arrangements or is unprecedented, see Figure (2).

3.1. Traditional Military Models of Command

In warfare command must be absolute. Indeed, historically it has been common for summary justice to be administered, often in the form of capital punishment, to military personnel who do not obey commands. In the past, as at present, countries that

Figure 2. Rescuers from different organisations in front of an advanced medical post (first-aid post).

lacked a civilian emergency response structure usually had nothing to rely upon except their military forces, which would apply the same command processes to natural disasters as they would to situations of military conflict. These involved hierarchical chains of command and communication. The direction of operations would be highly centralised and orders would pass down the chain. While this system had the advantages of being straightforward and robust, it was also cumbersome, inflexible and insensitive [16].

The worst excesses of military command were probably experienced during the First World War on the battlefields of Flanders and Asia Minor. Large numbers of soldiers were sent to certain death by means of orders that had little or no military and strategic justification and that showed the glaring inflexibility and incompetence of the officials who emitted them. In the history of military intervention in natural disasters there have been parallels, for example in San Francisco after the 1906 earthquake when the U.S. Army indiscriminately executed presumed looters.

3.2. Incident Command System (ICS)

The Incident Command System is an offshoot of military command models. It was developed in the aftermath of wildfires that devastated areas of California on a hot, dry summer's day in 1970. At that time the existing system of control was inadequate for the number of decentralised operations, and so a new concept of operations was developed and over the years gradually adopted throughout the United States and in a limited number of other countries [17].

ICS seeks to create common channels and terminologies of communication between the various forces in the field. It is a modular system in which command is instituted directly at the site of an emergency. As new resources arrive they are successively absorbed and integrated into the system. The incident commander presides over planning, information, logistics, safety and administrative managers and their respective sections. Responsibility is delegated in such a way as to manage the span of control. The success of operations depends critically on the sharing of information between sections, commanders, and between the site of the incident and the emergency operations centre [18].

Through the National Incident Management System (*NIMS*) the United States has succeeded in bringing *ICS* up to the level of a standardised nation-wide methodology for managing events [19]. It has proved to be a sound, logical and robust system that, with appropriate training, can easily be mastered and applied. It works best when it is fully known, understood and shared by all participants in emergency response, and when the prevailing objectives are well defined, clear, reasonable, consistent and have been prioritised. In order to determine the allocation and usage of resources, planning is required both before an incident (through the general emergency operations plan) and during it.

The first advantage of *ICS* is that it offers a robust form of command in which the person in charge, and all appropriate functionaries, are easily recognisable by the wording on their reflective tabards. Spans of control are kept within manageable limits, continuity of command is assured because it refers to the figure, not the person: in other words, the incident commander can be changed at will, providing there always is an incident commander and full continuity is maintained. Another advantages is that the system can expand to absorb resources (personnel, vehicles, equipment, supplies, etc.) as they arrive on site. This ensures that new arrivals are not left outside the command system without a role. It also gives the opportunity--and the imperative--to ensure that working practices and terminology are homogenised. This provides a ready answer to one of the greatest problems of emergency management: how to ensure that organisations work effectively together under exceptional circumstances.

Like other systems of command, *ICS* is not infallible. It has difficulty in integrating many agencies and groups into the command structure and cannot cope effectively with organisations that do not wish to be part of it. It may also have difficulty in reconciling

disputes between organisations and, while it is an excellent system for the crisis phase of an emergency, it is not particularly well adapted to the medium and long term, nor to long drawn-out crises. However, the protagonists of *ICS* argue that these problems are often the result of failure to train operatives adequately and conduct regular exercises.

In the end, the applicability of *ICS* is a question of cultural context. If the administrative, social and organisational cultures are favourable, it will take root and flourish. If not, then it is inappropriate. Therefore, culture either predisposes organisations and operatives to work in *ICS* or it inhibits them and shows a need for another system of command.

3.3. Command and Decision Support Systems

ICS is a pragmatic, but also a bureaucratic, system of emergency management that relies on obtaining, analysing, storing and sharing information. As such, it is a child of the information technology age, which has revolutionised attitudes to command and offered new possibilities hitherto undreamed of. Geographic information systems, satellite communications, decision-support systems with logical operators and the integration of these phenomena are examples of how the technology can be used creatively to support command processes and make them more responsive to the needs of beneficiaries and emergency responders [20].

The information and communications technology revolution is moving emergency response steadily towards the greater integration of its technological (or scientific), administrative and social components. For example, terrestrial trunked radio (*TETRA*) enables highly flexible communication to take place between a wide range of responders at all levels of the command hierarchy. Large sections of the traditional command structure have simply been dispensed with as a result of the ability to report information easily and automatically via digital technology. This has naturally taken the emphasis off command and placed it onto collaboration and co-ordination. Thus, command has undergone a subtle shift towards defining thematic areas in which to work and ensuring that all problems are properly covered.

With regard to disasters, Quarantelli [21] listed some of the social and perceptual connotations of the information technology revolution, which he regards as a development on a par with the invention of printing and the spread of literacy. His analysis made it clear that technology is only partly a question of devices and mechanisms but is heavily dependent on how people and society adjust to it. As the pace of technological development is frenetic and sustained, in the future we can expect major changes in the ways that command is practised. Perception will probably continue to lag behind the potential and possibilities opened up by the new technologies.

4. The Perception Factor in Command Systems

It has long been clear that people react to circumstances on the basis of their perceptual models of reality, and that these may or may not reflect how things actually are [22]. Over the last half-century a considerable body of information has been accumulated on the ways in which people perceive and react to disaster [23].

Most emergency managers are well aware that public perceptions of hazard and risk present both opportunities to improve disaster management and constraints upon it [24]. However, it is easy to forget that emergency responders are also members of the public and thus they too suffer from some of the popular approximations and misconceptions about disasters [25]. Moreover, levels of knowledge and experience vary widely from one individual to another. Despite the need to provide a remedy, we are still a long way from establishing a consensus on how training might solve the problem. Misconceptions include the prevalence of panic, the enhanced risks of epidemics after disaster and the belief that unburied dead bodies can be a threat to public health. As they can have a profound impact on management decisions, unreliable perceptions such as these are particularly dangerous when they occur at the level of senior commanders.

5. Management and Disaster Management, or Do You Want to be Commanded and Controlled?

In the modern world, the academic and practical discipline of management has its roots in capitalism (the organisation of production, distribution and consumption) and the nation state (through civil administration). However, disaster management has more diverse roots, and for this reason there are occasions when it is incompatible with its nominal parent discipline [26]. Let us examine how.

To being with, in disasters, order does not spring from chaos by management alone. The essence of managing an emergency is to apply available resources to urgent problems in the most timely and efficient

manner: in this respect ordinary management principles should be followed. However, there is also a vital need to understand and anticipate contingencies before they materialise--in other words, to reduce the level of improvisation in a disaster to a minimum. Thus emergency planning is at least as important as emergency management and should always precede it [15]. The field is strongly allied to urban and regional planning, not least because both should tackle the question of the 'hazardousness of place'--i.e. reducing the risks of human settlements and activities [27]. In fact, perhaps 75 per cent of crisis and disaster management is a geographical question: it begins with the need to know what has happened and where and then becomes a question of ensuring that resources are in the right place at the right time.

Disaster management is thus much more than a technique to be learned in advance and applied ad hoc. It requires careful consideration of the scenarios for hazard, vulnerability, risk, impact and emergency action [28]. It adds up to a need to develop techniques of “thinking the unthinkable” and “foreseeing the unforeseeable”. This can, and should, be done and is one of the distinctive features of command in civilian emergencies.

The essence of disaster management is therefore not leadership in chaos--management as reaction--but rather the application of procedures that have been carefully worked out in advance. The degree of maturity of a country’s emergency preparedness system can therefore be judged by the extent to which it is based on detailed (but flexible) planning and to which it is participatory. This may we mean that low levels of development are represented by the command and control approach [29]. Command and control has its origins in both warfare and colonialism. It divides participants into a disaster into commanders and commanded, and sets ground rules for how the former will control the movements and activities of the latter. Granted that control must be exercised over public safety and the efficiency of emergency operations, it is nevertheless easy to take this approach too far.

The challenge of the 21st century is to democratise emergency preparedness in such a way that ordinary people take more responsibility for their own safety. This will require them to know the risks, face up to them and make informed choices [30]. In extreme situations, it will also involve safeguarding their rights, not setting these aside.

Much progress has been made in designing and implementing civil systems for the management of civilian emergencies. The civil defence that grew up in response to 1940s air raid precautions and subsequent Cold War attack scenarios has mercifully ceded ground to civil protection against earthquakes, floods, storms, toxic spills and so on. But the cold warriors have not disappeared, they are in fact ready to stage a come-back. The terrorism threat is drastic enough to require more authoritarian methods of management than do most civil emergencies. It also involves different levels and criteria of predictability than most other non-military hazards. But need it require the suspension of participatory emergency management? Has anyone asked members of the general public whether they wish to be commanded and controlled, and if so to what extent? Is authoritarianism really the way to manage great crises? All these questions remain largely unanswered.

In addition, there are both small and large issues of democracy. With regard to the former, public support for emergency management must depend to some extent on sharing information and guaranteeing rights. One of the largest issues is that command and control structures may in extremis be used either to safeguard the chosen few, rather than the public in general, or to safeguard the state against the demands of the public. At present there is a serious risk that civil protection services, which prize their own neutrality, could inadvertently be drawn into situations of extreme polarisation and forced to side with one party or the other. This is a risk that has loomed very large at recent anti-globalisation protests.

6. Command and Colonise

A 1979 United Nations report on disaster management in developing countries observed that technologies and management techniques developed in Western countries are often inappropriate for managing emergencies in the world’s poorer countries [31]. Knowledge and expertise are not necessarily directly transferable. Despite this, there has been a tendency to assume that such methods are etic--i.e. independent of specific cultural referents. In reality they are emic--dependent on assumptions about cultural acceptability and feasibility [32]. Thus in local indigenous circles, the foreign expert who arrives in an unfamiliar country and seeks to apply his or her knowledge to local problems has become something of a detested obstacle to good emergency preparedness [33].

The problem has its origins in the colonial epoch in such historical events and the British mismanagement of famines in the Indian subcontinent [34] or the brutal colonialism applied by Western powers in the Middle East in the first half of the twentieth century. It has persisted in the extraordinary poverty of solutions offered by countries that purport to manage disaster well and transfer their expertise to those that lack appropriate knowledge and structures. For whom are disasters being managed? By educating a professional class and diffusing a universal body of know-how are we pitting professionals against local people? [35].

At its worst, globalisation can be interpreted as an integrated system of commercial exploitation that has had the effect of increasing the world's income differentials, concentrating wealth in few hands, and spreading poverty, marginalisation and polarisation. If that is so, then it is a situation which facilitates the return of the colonial approach to emergency management, in which dissent, as much as disaster, has to be managed, and order and stability have to be restored at any cost.

7. Conclusions

In synthesis the objectives of emergency command are as follows:

- To begin, consolidate, wind down and conclude emergency operations
- Activate the emergency plan and apply its provisions
- Apply procedures and protocols
- Co-ordinate operations to ensure efficient and effective allocation and use of resources
- Ensure that agencies and organisations work together
- Maintain exclusion zones
- Maintain continuity of operations.

Clearly, these aims can be achieved by different means and it is vital that the methods adopted be compatible with the institutional culture and social expectations of participants.

Is it inevitable in a divided world that we be split up into those who manage and those who are managed? In terms of preparedness for disasters the problems have steadily worsened, despite decades of hard work on devising new solutions. Besides the importance of well-known factors such as increased risk-taking, rising urbanisation and burgeoning populations in hazardous areas, the problem is also a result of the primacy of science, management and autarchic establishments. We may talk, not about policy, which ought to be sensitive to real, fundamental needs, but about "policy metaphors", which impose parameters where variables are warranted.

In order to tackle the peacetime emergencies that threaten populations, civil protection needs to be managed from a grass-roots perspective. The key words are "participatory" and "empowerment". Volunteer groups need to be trained and encouraged to improve their professionalism; ordinary people need to take more responsibility for their own safety. Modern information flows need to be the catalyst for sharing the burden of disaster. The technical component of disaster management is set to increase in both developed and developing societies. There will thus be a convergence of problems and solutions, but not one in which there will be any right or other justification for imposing solutions upon people.

The prospects for democratising civil protection worldwide need to be evaluated in the light of global trends in exploitation, diplomacy, hegemony and the uses to which new technologies are put. We must differentiate structure from mentality or mind-set. It is vital that the former not be conditioned by outdated forms of the latter. Neither at home nor abroad should risk and emergencies be managed by excessive use of command and control, or excessively technocratic management systems, or of excessive economic management by monetarism. New paradigms of global security should not be used as an excuse for reintroducing forms of exploitation under the guise of preventing terrorism or forcing the pace of development.

In future years there will be an increasing convergence of emergency management systems between rich and poor countries, as both will have to cope with the growing complexity of modern disasters and the international dimensions of their impacts. This is a positive trend and it is essential that the convergence be based, not on rigid crisis management systems, but on management processes that emphasise planning to foster flexibility, co-operation and co-ordination.

References

1. Coburn, A. and Spence, R. (2002). "*Earthquake Protection* (2nd edn)", Wiley, Chichester, UK.

2. Comfort, L.K. (1994). "Risk and Resilience: Inter-Organizational Learning Following the Northridge Earthquake on 17 January 1994", *J. Contingencies Crisis Management*, **2**(2),

157-170.

3. Foster, E. (1995). "NATO's Military in the Age of Crisis Management", Royal United Services Institute, London.

4. Stanovich, M. (2006). "Network-Centric Emergency Response: The Challenges of Training for a New Command and Control Paradigm", *J. Emergency Management*, **4**(2), 57-64.

5. Bruning, J.L. (1964). "Leadership in Disaster", *Psychology*, **1**, 19-23.

6. Janis, I.L. (1989). "Crucial Decisions: Leadership in Policymaking and Crisis Management", Free Press, New York, Collier MacMillan, London.

7. Blanchard, B.W. (1984). "American Civil Defence 1945-1984: The Evolution of Programs and Policies", National Emergency Training Centre, Federal Emergency Management Agency, Emmitsburg, Maryland.

8. Alexander, D. (2002). "From Civil Defence to Civil Protection--and Back Again", *Disaster Prevention and Management*, **11**(3), 209-213.

9. Milliman, J., Grosskopf, J., and Paez, O.E. (2006). "An Exploratory Study of Local Emergency Managers' Views of Military Assistance/Defence Support to Civil Authorities (MACA/DSCA)", *J. Homeland Security Emergency Management*, **3**(1), Paper 2.

10. Woodbury, G. (2008). "Emergency Management and Homeland Security: Exploring the Gray Area", in "Emergency Management in Higher Education: Current Practices and Conversations", Public Entity Research Institute, Fairfax, Virginia.

11. Arbuthnot, K. (2008). "A Command Gap? A Practitioner's Analysis of the Value of Comparisons Between the UK's Military and Emergency Services' Command and Control Models in the Context of UK Resilience Operations", *J. Contingencies Crisis Management*, **16**(4), 186-194.

12. Foster, H.D. (1980). "Disaster Planning: The Preservation of Life and Property", Springer, New York.

13. McEntire, D.A. (2007). "Disaster Response and Recovery: Strategies and Tactics for Resilience", Wiley, Hoboken, New Jersey.

14. Couig, M.P., Martinelli, A., and Lavin, R.P. (2005). "The National Response Plan: Health and Human Services the Lead for Emergency Support Function No. 8", *Disaster Management Response*, **3**(2), 34-40.

15. Alexander, D.E. (2002). "*Principles of Emergency Planning and Management*", Terra, Harpenden (UK), and Oxford University Press, New York.

16. Anderson, W.A. (1969). "Social Structure and the Role of the Military in Natural Disaster", Sociology Social Research, **53**, 242-252.

17. Buck, D.A., Trainor, J.E. and Aguirre, B.E. (2006). "A Critical Evaluation of the Incident Command System and NIMS", *J. Homeland Security Emergency Management*, **3**(3), Article 1.

18. Irwin, R.L. (1989). "The Incident Command System (ICS)", In Auf Der Heide, E. (ed.) Disaster Responses: Principles of Preparation and Coordination, Mosby, St Louis, Missouri, 133-163.

19. Jones, J. (2006). "NIMS Incident Command System Field Guide", Informed Publishing, Tigard, Oregon.

20. Marincioni, F. (2007). "Information Technologies and the Sharing of Disaster Knowledge: The Critical Role of Professional Culture", *Disasters*, **31**(4), 459-476.

21. Quarantelli, E.L. (1997). "Problematical Aspects of the Information/ Communication Revolution for Disaster Planning and Research: Ten Non-Technical Issues and Questions", *Disaster Prevention Management*, **6**(2), 94-106.

22. Whitney, D.J., Lindell, M.K., and Nguyen, H.D. (2004). "Earthquake Beliefs and Adoption of Seismic Hazard Adjustments", *Risk Analysis*, **24**(1), 87-102.

23. Drabek, T.E. (1986). "Human System Response to Disaster: An Inventory of Sociological Findings", Springer, New York.

24. Scanlon, T.J. (1991). "Reaching Out: Getting the Community Involved in Preparedness", in Drabek, T.E., and Hoetmer, G.J. (eds), "Emergency Management: Principles and Practice for Local Government", International City Management Association, Washington, D.C.

25. Alexander, D.E. (2007). "Misconceptions As A Barrier to Teaching About Disasters", Prehospital Disaster Medicine, **22**(2), 95-103.

26. Greening, D.W. and Johnson, R.A. (1996). "Do Managers and Strategies Matter? A Study in Crisis", *J. Management Studies*, **33**(1), 25-51.

27. Britton, N.R., and Lindsay, J. (1995). "Integrated City Planning and Emergency Preparedness: Some of the Reasons Why", *Int. J. Mass Emergencies Disasters*, **13**(1), 67-92.

28. Alexander, D.E. (2000). "*Confronting Catastrophe: New Perspectives on Natural Disaster*", Terra Publishing, Harpenden (UK), and Oxford University Press, New York.

29. Waugh, W.L. Jr. (1993). "Co-Ordination or Control: Organizational Design and the Emergency Management Function", *Disaster Prevention and Management*, **2**(4), 17-31.

30. Platt, R.H. (1999). "Disasters and Democracy: The Politics of Extreme Natural Events", Island Press, Washington, D.C.

31. U.S. National Academy of Sciences (1979). "Assessing International Disaster Needs", National Academy Press, Washington, D.C.

32. Brislin, R.W. (1980). "Cross-Cultural Research Methods: Strategies, Problems, Applications", in Altman, I., Rapoport, A., and Wohwill, J.F. (eds), "Human Behavior and Environment, **4**, Environment and Culture", Plenum, New York, 47-82.

33. Allinson, R.E. (1993). "Global Disasters: Inquiries into Management Ethics", Prentice-Hall, Englewood-Cliffs, New Jersey.

34. Hall-Matthews, D. (1996). "Historical Roots of Famine Relief Paradigms: Ideas on Dependency and Free Trade in India in the 1870s", *Disasters*, **20**(3), 216-230.

35. Beatley, T. (1988). "Ethical Dilemmas in Hazard Management", Natural Hazards Observer, **12**(5), 1-3.