Chapter 4
Research Design

4.1 Introduction

Initial review of the literature on the managerial structure, procedures and processes (as existed on 26 January 2001) in the State of Gujarat reveals the “Re-active and relief oriented” disaster management system. Various other gaps and deficiencies are also observed. Keeping in view the research challenge and the underlying motivation to study the “relative performance” in emergency and disaster response management in the dynamics of Government domain, a design of research is presented in this chapter. This includes description design of the research questions, issues to be addressed, scope of the research, and objective of research, research model, research proposition and methodologies to be employed.

4.2 Terminology Used in Disaster Management

A variety of terms is used in the fields of emergency and disaster management. Over time, a fairly standard set of definitions has emerged, as reflected in a series of reports from the National Research Council and other groups. Emergencies, disasters, and catastrophes, for example, are distinct events with important differentiating characteristics (NRC, 2006). This report does not specifically consider “emergencies” - a term that connotes “everyday” events that can be handled within the normal operational limits of public safety agencies - nor does it distinguish between disasters and larger-scale events that might be called catastrophes, even though it is likely that the value of information technology capabilities increases as the complexity and scale of communication problems become greater. Throughout this report, the term “disaster” can be read as “disaster and catastrophe.”
The report of National Research Council, *Facing Hazards and Disasters: Understanding Human Dimensions* provides a detailed discussion of the importance of agreeing on basic definitions and the difficulty in doing so (NRC, 2006).

- Disasters are non-routine events in societies, regions, or communities that involve conjunctions of physical conditions with social definitions of human harm and social disruption. The term “disaster” has significant policy implications; for example, a declaration of an event as a disaster is needed before certain resources are made available.

- Hazards are a source of potential or actual harm. Hazards may be natural, technological, or willful in origin. Examples of natural hazards include floods, hurricanes, earthquakes, tsunamis, tornados, and so on. Technological hazards include industrial accidents and other human-made sources of potential harm. Bhopal and Chernobyl are examples. Terrorist attacks such as those on September 11, 2001, and the bombing in Oklahoma City are examples of willful hazards.

- Incident (or event) is the specific occurrence of a disaster. A single disaster incident may lead to additional incidents. For instance, an earthquake may lead to a tsunami and the tsunami may lead further to flooding. The term “incident” also has important bureaucratic meaning (e.g., incident period) that determines, for instance, who qualifies for financial assistance.

- Risk is a function of the likelihood (i.e., probability) of a specific event occurring and the potential consequences of harm should it, in fact, occur.

- Hazard vulnerability is the potential for physical harm and social disruption to societies and their larger subsystems associated with hazards and disasters. There are two general types of vulnerability: physical vulnerability and social vulnerability. Physical vulnerability represents threats to physical structures and infrastructures, the natural environment, and related economic losses. Social vulnerability represents threats to the well-being of human populations and related economic losses.

- Hazard mitigation is an ongoing effort to reduce the physical and social impact of future disasters. It includes interventions made in advance of disasters to prevent
or reduce the impact. There are two major types of hazard mitigation: Structural 
mitigation involves designing, constructing, maintaining, and renovating physical 
structures and infrastructures to resist the physical forces of disaster impacts. 
Nonstructural mitigation involves efforts to decrease the exposure of human 
populations, physical structures, and infrastructures to hazardous conditions.

- Disaster preparedness includes actions taken in advance of disasters to deal with 
  anticipated problems of disaster response and recovery. Actions include training 
  and exercises to improve readiness; development and refinement of response and 
  recovery plans; development, deployment, testing, and maintenance of systems 
  used for disaster management; and public education and information programs for 
  individuals, households, firms, and public agencies.

- Disaster response provides for the immediate protection of life and property, 
  reestablishing control and minimizing the effects of a disaster. It encompasses the 
  issuance and dissemination of predictions and warnings; planning and preparation 
  immediately before an event (such as preparations following a hurricane 
  warning); evacuation and other forms of protective action; mobilization and 
  organization of emergency personnel, volunteers, and material resources; search 
  and rescue; care of casualties and survivors; damage and needs assessment; 
  damage control and restoration of public services; and maintenance of the 
  political and legal system.

- Disaster recovery encompasses both short-term activity intended to return vital 
  physical and social systems to operation and longer-term activities designed to 
  restore these systems to their pre-disaster state. The concept of recovery 
  encompasses both objective measures, such as reconstruction and assistance 
  efforts, and the subjective experiences of disaster victims and processes of 
  psychological and social recovery.

One of the essential characteristics of disasters is their complexity. Although disasters 
may have relatively discrete origins, their effects propagate and interact in ways that 
intensify the complexities and uncertainties of dealing with them effectively. One major 
result is that disasters must be responded to in an environment that can be overwhelming,
unfamiliar, and disorienting. These challenges are quite familiar to experienced emergency managers and first responders, as manifest in a homespun sign found in many U.S. emergency operations centers. This sign stands in marked contrast to a sign described by a reviewer of this report in draft form that lists what emergency managers aspire to—and often achieve despite the many obstacles—in a disaster. Disaster management is a multifaceted process aimed at minimizing the social and physical impact of these large-scale events. The difficult nature of disaster management is well illustrated by the Catastrophic Incident Annex to the National Response Plan, which lists some of the potential problems faced in the aftermath of a disaster.

4.3 Research Questions

Having had the clear idea as to the need for the research, it is possible to delineate specific research questions. The context which inspires the research questions along with the specific research questions are given in the table 4.1 given below.

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>RESEARCH QUESTION</th>
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<tbody>
<tr>
<td>Direct or indirect involvement /experience/ exposure during 2001 Bhuj earthquake is necessary for establishing relevance of the respondent to this study.</td>
<td>Research question –</td>
</tr>
<tr>
<td>Community remains the first responder in case of any disaster. The Knowledge and awareness of community on various kind/type of natural disasters help first responders to react as required.</td>
<td>• Knowledge on types disasters</td>
</tr>
<tr>
<td></td>
<td>• Personal exposure to any natural disaster</td>
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<td></td>
<td>• Personal exposure to 26th Jan 2001 earthquake at Bhuj</td>
</tr>
<tr>
<td></td>
<td>• Personal impact of 21st Jan 2001 earthquake on the sample member</td>
</tr>
<tr>
<td></td>
<td>• Presence of mind and coordination capacity enabling perception of</td>
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</table>
Past / previous experience or exposure to disaster influences the disaster preparedness.

Assessment of community’s awareness of various disaster, previous exposure, it’s perception of the incident (26 January 2001 Earthquake) become very relevant and pertinent.

Devastating emergency situation like earthquake may have widespread impact in a large area and inflicts injuries and losses to the majority of inhabitants.

In addition to ethical dimension, the “personal dimension / concern” plays an important role in navigating individual’s capacity utilization and its direction. People react differently under “personal concerns and stresses” and under “ethical concerns and stresses”.

In community/individual response during emergencies, it is common to see the forces of self-interest in action. Assessment of differential response attitude existing in any specific socio-cultural environment becomes relevant to the study.

As stated earlier community (constitutes of

<table>
<thead>
<tr>
<th>Research question</th>
<th>disaster when the earthquake struck</th>
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<tr>
<td>• What worried you most at the time of earthquake</td>
<td>• Sound perception of the earthquake</td>
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<tr>
<td>• How people were rescued during first four- eight hours of the earthquake.</td>
<td>• Movement perception</td>
</tr>
<tr>
<td>• How much time it took to complete the rescue efforts (i.e. Could all people be rescued alive?)</td>
<td>• Perception of changes in the surrounding</td>
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<tr>
<td>• What type of tools was used for rescue operation?</td>
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</table>
individuals) is the first responder in any emergency situation arising out of natural disaster. Community Disaster preparedness influence response effectiveness.

Rescue has to commence spontaneously when any disaster strikes as any delay in rescue operation will result into increase in casualties and suffering of those injured and/or buried under structures.

Assessment of – how rescue operation was accomplished (tools used etc), and how fast rescue operation was accomplished (time taken to dig people out) become very relevant to study directed to “organizational performance and effectiveness in disaster response”.

Different type and kind of medical emergencies manifest out of different type of natural disaster. Shaping triage and medical attendance suiting to nature of calamity is an important issue for the Disaster Management agency in the area. Assessment of – how injured were manage become relevant to the study.

Another aspect of MES (Medical Emergency Services) related to medical

Research question
What happened to those who were injured during the earthquake?
service resources and inventories, was examined during one-to-one interaction with the officials in-charge posted in the affected area.

National and the State Governments bear the sovereign responsibility to the best of their abilities to protect their citizens from disasters. Government needs to be ready and responsive to manage any disaster effectively. Public should have fullest access to the Government for all disaster related issues. Government should also disseminate important instructions related to emergency response rescue and relief operation. This is very relevant here to measure – readiness of the Government system and its accessibility to affected people & responsiveness during emergency.

Traditionally, NGO plays an important role when disasters are wide spread over a large area, geographically. NGOs generally get into gear faster then Government as they do not need to follow procedures, norms and hierarchies which are inseparable in a government system. NGO comes from – corporate & industrial sector, religious institutions, educational institutions, social forums / institutions etc.

<table>
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<tr>
<th>Research question</th>
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<tbody>
<tr>
<td>• Did you access Government agency for rescue / relief assistance?</td>
</tr>
<tr>
<td>• How Government agency responded to your call?</td>
</tr>
<tr>
<td>• Was there any information dissemination by rescue / relief operations, Do’s, and Don’ts for common man?</td>
</tr>
<tr>
<td>• Did any representative from Government visit your area on the first day of disaster?</td>
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<table>
<thead>
<tr>
<th>Research question</th>
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<tbody>
<tr>
<td>• Did any agency other than the Government arrive to help rescue work in your community on the first day of disaster?</td>
</tr>
<tr>
<td>• Identity of NGO</td>
</tr>
<tr>
<td>• Who was more effective in helping rescue work (NGO, Government, community etc)?</td>
</tr>
</tbody>
</table>
NGOs participation and their effectiveness during various stages (rescue, relief and rehabilitation) is very relevant in this study.

<table>
<thead>
<tr>
<th>Impacts on commodity supplies and other resources vary with the Nature, type and magnitude of disaster. Monitoring, identification and management of critical resource needs for survivors and others in aftermath of a disaster are important indicators for assessment of effective resource coordination. Relevant questions are included in this regard also.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research question</td>
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<tr>
<td>• What was the critical requirement on the first day of disaster?</td>
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<tr>
<td>• What was the critical requirement on the second day of disaster?</td>
</tr>
<tr>
<td>• Who was controlling and managing relief supplies?</td>
</tr>
<tr>
<td>• How effective was the distribution of relief material / supplies?</td>
</tr>
<tr>
<td>• How relief supply could have been managed better?</td>
</tr>
<tr>
<td>• Who controlled and managed Rehabilitation works?</td>
</tr>
<tr>
<td>• Were rehabilitation works effective and satisfactory?</td>
</tr>
<tr>
<td>• Identify an agency that did very good work in rehabilitation work, from your point of view.</td>
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</table>

Utilities – Electricity and water – infrastructures gets affected during any disaster. Such services can be restored quickly if there was an adequate disaster management plan in place with utilities agencies. Measurement on restoration on time scale is done to assess service provider’s disaster preparedness.

| Research question |
| • When did you have electricity service restored first time after the disaster (how many days after)? |
| • When did you have water service restored first time after the disaster (how many days after)? |
| It is important to keep on continuous monitoring of the emerging situations in the post disaster period so as to synchronize mobilization of efforts and resource with the evolving conditions. | Research question  
- the first Government representative who visiting your area was — (Talati/Malatdar/Police personnel/ any other.)  
- When the representative visited (how many days after the disaster)? |
<table>
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<tbody>
<tr>
<td>Such assessments are done by site visitation and / or by running appropriate simulation model by the disaster management agencies. Relevant questions are included in this study.</td>
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</table>
| Schools are important infrastructures in any community. Commonly schools are used as “emergency shelters” during disaster situation. Schools are also identified as the most important gateway to percolate disaster preparedness into the society. While re-opening period of schools is measured here, a separate survey was conducted on the “school emergency preparedness plane”. | Research question  
- When schools restarted and your children started going there? |
| State Government is responsible for managing emergencies and disasters under their jurisdiction. Local government is the first responder to any emergency under its jurisdiction. | Research includes in-depth interviews with domain managers at different level in Government system responsible for emergency and disaster management. |
| California state (USA) has one of the best emergency and disaster response organization. | A detailed case study is undertaken on the office of emergency services (OES), California, USA. |
4.4 Research Objectives

To have answered to the above research questions, following research objectives have been set to:

- The study of the performance of disaster management during 26 January 2001, Bhuj earthquake in Gujarat state;
- Study of the Disaster Management policies and practices in the state of Gujarat and at the national level;
- To investigate the status of National “Organization system and Policy Framework” for emergency and disaster management in India as on 26 January 2001.
- To study the status and effectiveness of “Organization system and Policy Framework” for emergency and disaster management in the State of California (USA).
- To do gap analysis between disaster management organization system of California (USA) and that of Gujarat (India), through a comparative study.
- Derive Intervention strategies based on the above learning’s and issue suggestions / recommendations for “effective emergency and disaster response management system” in the state of Gujarat / India.

4.5 Issues

It is important to delineate the issues which need to be addressed in the context of the research objectives. Some of the key issues are described as given below:-

A common vision, Goals and objectives

Disaster Management (DM) vision and agenda that encompasses all levels in social & Governance (National, State, Local) system – following planning process with top-down
approach & action process with bottom-up approach. National policy plays an important navigational role for disaster management system. States may not have critical resources and skills, both in quality and quantity, and will always look for support from the National Government. The disaster management systems at national, State and Local level should work in perfect synchronization for enhancing effectiveness and efficiency through synergy.

**Policy and Legislation**

The diversities in preparedness and response efforts and their effectiveness are attributed to the variable structure of hazard management policies in the Government system. Effective Hazard reduction activities needs well defined policy, which is agreed upon, accepted and practiced by all stakeholders. Development and implementation of more coherent sets of principals, policies and procedures are essential for emergent disaster management system which is envisaged to work on the principal of “synergizing by coordination and sharing of resources”. These would assist different institutions / originations to better understand each other in a multi-agency environment. Effective and efficient coordination (vertical as well as horizontal) is critical in hierarchical governmental system working with distribution powers and responsibilities connected to jurisdictions.” Coherent policies and practiced procedures” are driving force for assured cooperation and coordination. Policies, strategies, planning, tactics and actions all converge to a singular objective of “secured and safer” community.

The Indian policy system assigns state Government the primary responsibility for emergency management under the guidelines issued by central government. Ironically each state has different priorities guided by extreme socio-economic-political conditions. Central policies would play an important role in establishing standard emergency management system based on the principals of coordination and sharing.
**Preparedness**

A combination of good planning and good management results into effective emergency and disaster preparedness. It applies to all stakeholders in the process including national, state and local Government. Emergency operation plans should be derived from a careful analysis of the types of hazards to which a community is vulnerable and an assessment of the community’s resources for responding to those hazards. These resources include trained personnel, specialized equipment, support facilities, and financial resources (Tierney, 2001). India needs disaster management policies focused more on mitigation and preparedness, which can make society more resilient and disaster ready than the relief oriented measures.

**Leveraging modern technologies (Information & Communication Technology for Decision Support System or DSS)**

Recent natural disasters have resulted in a media frenzy highlighting the problems inherent in the disaster management community. One of the well-published issues lies in the establishment of core data and network infrastructures for disaster response teams (Meinrath, 2004). However, very little acknowledgement is made of the need for ICT support at the higher information management levels.

**An independent DM organization (DMO) with Involvement of senior level officers at appropriate level**

DM organization (DMO) in Government is not some thing much “sought-after” for postings by senior level officials. On the contrary positions in DM organization are considered highly vulnerable to public and political criticism. Most of the officers are averse to their induction or posting in DMO. An independent cadre in DMO is the only answer looking to its characteristics of works and activities. Disaster management needs a combination of techno-managerial-administrative skill set.
DMO's level of interface in Government hierarchy (Chief Minister, Chief Secretary etc.) would influence "survival of DM programs" in the state. Weaker and lower links would reflect low priority assigned by the state and ultimately result into extinction of disaster management systems and attached program.

**Priority** – is very important. Planners and decision makers in the Government often get carried away by priorities like – health, education, industry, transport. Disaster Management tends to be relegated to some thing which can wait as disasters are not frequent happenings. Unless, DM is unmistakably taken right into the transitional operations, the question of priority may undermine its importance.

**Disaster Management and challenges**

Disaster Management related activities are to be planned and managed carefully. With the basic objectives, scope defined, and real time inflow of desired information – it should be possible to identify constraints that may appear in the way of effective implementation of DMS (Disaster Management strategy) and put necessary pre-requests to minimize the negative implications of the constraints at any given point of time. Each state of disaster management cycle has inherent dynamics needing “continuous (24*7 & 365 days a year) check and control”. The disaster management agency needs to work in project mode every time & ball throughout.

### 4.6 Scope

The scope defines the boundaries of research in terms of its coverage and focus. Organisation response effectiveness shown in managing 26 January 2001 Bhuj earthquake has been the main domain of the study. In the questionnaire survey, it has been endeavored to investigate the – DM organizational structure, policy framework, planning and processes available in the state administration and how they were put to use in managing the Bhuj earthquake struck. The study also intends to investigate “lessons learned” and changes incorporated in the state disaster management system in the post
Bhuj earthquake phase. This has been south to be done by way of eliciting information/data through questionnaire survey, personal interviews of the domain managers (Government officials) responsible for emergency and disaster management at State, District and Local level. These officials are interviewed for eliciting most crucial inputs required in this study. Reference case Study of “Organization of Emergency Management Services (OES)”, California State (USA), is chosen considering hazards, vulnerabilities and risk similarities with Gujarat state. Research on the OES and its activities is done by personal visit to the establishment of OES and personal interaction with officials involved in emergency & disaster management activities there, in addition to literature search and review.

4.7 Research Model

Emergency and disaster response is a time sensitive activity and needs efficient decision making. An extreme incident may cause wider impact and destruction in the areas falling under different jurisdictions and needing effective situation monitoring and resource coordination. There would be need for “concurrent process engineering” with many agencies working independently with an objective to mitigate the impact of disaster. “Effective & Efficient Disaster Management” in multi-agency environment, would need intelligent Decision Support System (DSS). Role of Information & Communication Technology (ICT) has become crucial in emergency disaster management system. In a typical earthquake emergency – knowledge of – population density, infrastructure, agriculture, and other important resources with reference to the vulnerable area / zone becomes crucial for initial assessment and estimation of losses by simulation as physical access to the affected area would not be possible there. Similarly information on available resource inventory and its locations, demographic, geographic and other relevant information about the damaged area and surroundings, road network and other transport network to the damaged area, status of road network and possible transport routes, type and quantity of resource requirement, resource deployment etc.- is necessary for responding to the emergency effectively.
Modern technology offers tremendous opportunity for enhancing disaster preparedness and mitigation capacity. Intelligent crisis information system is effectively used in majority of US states in pre and post disaster situation. It is possible to enhance disaster management performance in all phases (from mitigation to preparedness, response and recovery phases) by leveraging modern technology.

Emergency & Disaster Management – The Research Model

Figure 4.1: The Research Model

The study is executed by conceiving a research model of Disaster Management System at State level cascaded with system at National level in the upstream and system at local level in down stream. The potential facilitators for disaster management includes, but not limiting to, - Policy framework, Organization system, Leveraging modern technologies for Decision support, information and communication linkages with all stake holders. These constructs have been chosen because of their importance as found in the literature.
on disaster management, typicality of the functioning of Government, various legal and institutional norms supplement the overall design of disaster management systems. Possible relationship between these factors and adoption and proliferation best disaster management practices in the state Government are depicted in the research model shown below Extent of the Disaster preparedness, both with in the organization as well as in the society is two important indicators in “Effective Disaster Management”.

4.8 Derivation of Research Propositions

The research model helps to derive a set of research propositions (connected to research questions and objective). These are explained as given below:-

Act / Legislation and Policy framework

Specific policy framework supported by appropriate Act/Legislation at the national and state level is basic necessarily for bringing discipline and efficiency into disaster management. Clarity on roles, responsibility, powers of different stakeholders is basic for effective response coordination in disaster management and should be covered under the legislative definitions.

Research proposition 1: Disaster Management Policy processes & Legislation would contribute to effectiveness of emergency and disaster management system.

Organisation system

Emergent Disaster Management System” is highly techno-centric and often functions in binary mode (level “0 or 1”, “No work or 100 % work”). This separates disaster management organization from other traditional Government department. Not only that it would need to identify, select and train appropriate HR from the existing cadre from
within the Government system, but also would need to develop a separate cadre of HR which is ICT ready to understand, operate and manage modern technology tools used in Decision Support System (DSS) with informative work process. The HR strategy should also consider provisioning critical "HR redundancies" to meet sporadic exigencies. Perpetual motivation and cross-functional training should be an integral part of the overall HR development plan for emergency & disaster management organization.

**Research proposition 2:** Emergent emergency and disaster management system will need a specific design for organization different from that of the traditional government structure. It would be independent Organisation system with strong multi-level interfaces with the government system.

**Application of Modern Technology & Disaster Management**
Robust interoperable communication networks, reliable & intelligent "Decision Support System" for analyzing (through modeling & simulation) tracking and allocation of resources, alert and warning system etc... are vital for effective disaster management system. The emergent emergency and disaster management functions in multi-agency environment and would need to use “concurrent engineering” principal for coordination and response.

**Research proposition 3:** Use of modern technology tools would enhance and improve emergency and disaster management.
Disaster Mitigation

The purpose of mitigation planning is to identify and implement policies that will reduce risk and future disaster losses.

**Research proposition 4:** Effective disaster mitigation policy and its implementation are crucial in managing disasters effectively.

Resource sharing

Demands outnumber the local resources in almost all disaster situations. In the developing countries, where resources scarcity is rampant, effective emergency and disaster response would need effective “resources sharing”. Establishing standardized system for resource sharing (mutual aid) at local, regional and national level would bring effectiveness into disaster management system.

**Research proposition 5:** Intra and inter-state resource sharing system would enhance capacity of each state to respond to emergency and disaster.

P-P-P (Private-Public-Partnership)

Public-Private-Partnership (PPP) is also a type of mutual-aid system with private / corporate sector as one of the actor. Disaster management would need a custom design for PPP model which would not only enhance resource capacity but also would bring the cost of ownership (COS) substantially down. Nicely tailored PPP model for emergency response and disaster management would bring efficiency, effectiveness and economy of scale.
Research proposition 6: P-P-P is necessary for enhancing state / local government's capacity to respond to emergency and disaster.

4.9 Research Methodology

A research methodology is a strategy of inquiry which moves from underlying philosophical assumptions to research design and data collection. The choice of the research method influences the way in which researcher collect data. Specific research methods also imply different skills, assumptions and research practices. Klein and Myers (1999) define four research methods as mentioned of inquiry i.e., action research, case study research, and ethnography and ground theory. These research methods can be broadly grouped in two categories: qualitative and quantitative methods. An agenda of research with multiple natures of strategic issues may require the indigenous application of several tools that are both qualitative and quantitative. In this research also – a combination of following methods has been used:

1. Domain Officers / Managers: Domain officers / managers provide ecological validity and insightfulness in identifying salient attitudes or perceptions (Lunt P., Livingstone S., 1996). The Domain Managers method brings together one or more official belonging to different level under the bureaucratic hierarchy to discuss the issue. It is crucial to understand and evaluate gaps between – “what Government were / are prepare to do in emergency management (i.e., bureaucratic norms) and what emerges as the expectation of situation, or more precisely the expectation of those victimized by the
disaster (i.e., emergent norms) Under the bureaucratic norms, each Government follows a system for responding to emergencies and disasters. In order to be considered a bureaucracy, an administrative structure must exhibit several basic characteristics. The exact nature of these characteristics varies from one analyst to the next (Weber, 1958; Downs 1966; Simon, 1976; Rourke, 1984; Wilson, 1989; Fesler and Kettl, 1991). However, four of the most common bureaucratic properties are: (1) clearly defined objectives; (2) a formal structure underlying the process and tying together the various component organizations; (3) a division of labor; and (4) a set policies and procedures guiding organizational activity.

Under the “Domain managers”, key officials in the Gujarat State bureaucratic system, attached to the subject matter (disaster management in the state) were identified and interviewed to get insight into the “existing bureaucratic norms in the state of Gujarat” and “how effective they were in managing 26 January 2001 earthquake”?

Domain Managers method was used primarily to assess the Government’s effectiveness in Managing Disaster & possible impact of - Policies, Procedural, Organizational, managerial & coordination, resources, networking etc on DM activities, and any new emergency norms which were manifested out of the disaster under investigation.

As per the guidance received from the senior officials in the state Government, format for in-depth interview was kept open to accommodate all kind of information inflow (previous and current experience, exposure, anecdote, reservations, resentments etc) from
the sample respondent. Respondents were informed, beforehand, that no personal information identity will be attached with the interview.

2. **By way of Questionnaire:** This is used primarily in collecting data relating to extent and effectiveness of managing Situation at the time of Disaster and Situation after Disaster (SAD) i.e. rescue, relief, rehabilitation works. The data pertains to 26th Jan 2001 Earthquake affected Bhuj District (State of Gujarat). Literature and find

Educational institutions / Schools are important centers for inducing disaster awareness (DA) & hence preparedness in to the society. A separate questionnaire was prepared for assessing the status of DA in the schools/ educational institutions.

Historically NGOs role can be seen in almost all major natural disasters in the world. NGOs are very important resource to the Government at the time wide spread disasters. Government needs to have set plans and coordination procedures for NGOs eligible to participate in DM. A questionnaire was prepared for NGO based on field observations.

A pre-test of the questionnaire was conducted with the District Government officials, students from IIM-A and local working class neighborhood. Major modification made as result of the pre-test was to add questions related to perception (visual, sensual) and reflex details at the beginning to sensitize respondent and gradually navigate to questions related to organizational performance and omit requirement of personal information.
3. **Case Study** on “Managerial Effectiveness in Emergency Response and Disaster Management during 26th Jan 2001 Earthquake in Bhuj District (Gujarat State). Various documents, statistics, extensive filed visits, observations, discussions and interviews etc. were used to elicit critical information during case study. Various issues – like first responders and readiness, communication network, policies & DM plans, decision making, rescue and relief related inventory management, NGO’s participation were looked into very closely.

**Research methodology used is depicted in flow chart as shown in figure below**-

**Flow Chart for Research Methodology**

*Figure 4.2: Research Methodology*

Brief overview of techniques employed for focus groups / individuals, surveys and the case study is given in the table below.
Table 4.2: Techniques Employed

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>DESCRIPTION OF THE STUDY</th>
<th>SAMPLING SCHEME</th>
</tr>
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<tbody>
<tr>
<td>Domain Managers (State Government)</td>
<td>Were constituted with the purpose of carrying out a perception analysis of the respondent (Disaster Managers) about the facilities and constraints offered by the existing policies and organization in managing disaster situation (in context of 26 January 2001 earthquake in Bhuj District).</td>
<td>Judgmental sampling</td>
</tr>
<tr>
<td>Broadly divided into three categories based on their level in the administrative hierarchy in the state Government system – Category I – Policy/Planning &amp; Decision making - consisting of Senior Officers from the Revenue Department responsible for disaster management in the state. These are the officers from Indian Administrative Services (IAS) and usually head the department responsible for policy development and its management. Revenue department hold Contingency Relief Funds (CRF) allocated and issued by the Government of India to be used for disaster and its management related activities.</td>
<td>The investigation was designed to assess opinion of the respondents on “26 January 2001 earthquake emergency response and its effectiveness”.</td>
<td></td>
</tr>
<tr>
<td>QUESTIONN AIR SURVEY</td>
<td>Questionnaires were designed for respondents from - the affected Community - 2nd set for NGOs - 3rd set for the Students</td>
<td>1(a) To study general disaster awareness of the communities 1(b) Community perception of</td>
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- **Category II – Supervisory/Incident Command** - consisting of District Collectors, Deputy Collectors & equivalent ranking officers. These officers usually head Districts and sub-divisions and act as incident commanders during emergencies anywhere under their jurisdiction.

- **Category III – Field Executives** - consisting of Mamlatdar / Dy Mamlatdar and other associates. These officers are the key strength in the Government functioning and discharge field-level revenue functions in the state Government.
<table>
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<tr>
<th>26th Jan 2001 EQ</th>
<th>1(c)</th>
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<tbody>
<tr>
<td>Community reaction to the Disaster</td>
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<td>1(d)</td>
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<tr>
<td>Damage &amp; recovery assessment</td>
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<tr>
<td>1(e)</td>
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<tr>
<td>Government's role and its effectiveness</td>
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<td>1(f)</td>
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<tr>
<td>Participation of agencies other than Government and their effectiveness</td>
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<tr>
<td>1(g)</td>
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<tr>
<td>Issues identified</td>
<td></td>
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<tr>
<td>2(a)</td>
<td></td>
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<tr>
<td>NGO’s during 26th Jan 2001 earthquake</td>
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<tr>
<td>2(b)</td>
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<tr>
<td>Managerial coordination between NGOs and Government</td>
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<td>2(c)</td>
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<tr>
<td>Effectiveness of NGOs</td>
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<tr>
<td>3(a)</td>
<td></td>
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<tr>
<td>Sample school/student disaster awareness assessment</td>
<td></td>
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<tr>
<td>3(b)</td>
<td></td>
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<tr>
<td>Gap analysis</td>
<td></td>
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<tr>
<td>CASE STUDY</td>
<td>Field Survey, Observations and interaction with Government officials at different level in the earthquake affected area. Affected community was also interacted in this regard. Visit to Office Of Emergency Service (OES) Governor’s office, California State(USA). Visit to the OES Warning center. Visit to State EOC, California State. Interaction with the officials of OES.</td>
</tr>
</tbody>
</table>
To study the strategic situation of Disaster Management.

The variables sought to be studied and measured are described in the table given below-

<table>
<thead>
<tr>
<th>Variable</th>
</tr>
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<tbody>
<tr>
<td>Perception of</td>
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<tr>
<td>1. Adequacy of Policy provisions for DM in the state</td>
</tr>
<tr>
<td>2. Adequacy DMO &amp; its resources</td>
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<tr>
<td>3. Networking and connectivity</td>
</tr>
<tr>
<td>4. Coordination and cooperation</td>
</tr>
<tr>
<td>5. Training and mitigational capacity building at various level</td>
</tr>
<tr>
<td>Major strengths and bottle necks encountered while managing Bhuj earthquake.</td>
</tr>
</tbody>
</table>

Disaster - community awareness and readiness |

Disaster management & Government |
1. Organization |
2. Standardization of emergency operation procedures |
3. ICT applications (SDI, GIS/GPS, WebEOC etc.) |
4. ICT Networks |
5. Capacity building |
6. Training and its contents |

Disaster management & NGOs |
1. Policy and procedures or inducting NGOs in DM activities |
2. Coordination and management of NGOs participation in any integrated DMP |
3. Registration / certification |

Capacity building - Drills and exercises |

Earthquake and its impact on various resources and their management
1. Water and Food  
2. Medicine and medical care  
3. Shelter  
4. Electricity, water supply and Sanitation

**Rescue and Relief work Management**
- 1. Disaster Assessment techniques and tools  
- 2. Disaster response based on assessment  
- 3. Communication and coordination systems  
- 4. Prioritization of response activities  
- 5. Inventory management during disaster  
- 6. Monitoring, measurement, analysis for re-adjustment of response activities

**School Safety Planning and Preparedness in Gujarat**
- 1. School Safety plan  
- 2. Emergency and disaster management in education  
- 3. Student awareness and preparedness on emergency and disaster

### 4.10 Implementation of Research Design

Government is responsible for Safety of life and property of the fellow citizens and plays a key role during Emergency response and Disaster Management in its jurisdiction. Relief Commissioner, who is a part of the State Government’s hierarchy is, traditionally, designated for Disaster Management and related activities. DM Policies and practices percolate from National to Districts / Taluka / Blocks and then Village level through under a hierarchical arrangement. Much of the inter-governmental (government of India, other states) coordination work is done by the Commissioner (Relief) or officials above this level, whereas intra-state coordination is implemented by the Director (Relief).
Domain Managers’ analysis was undertaken to identify the overall perception, approach and attitude of Government, as a major stake holder in DM. Key officials in all the three categories (Category I – Policy/Planning & Decision making - c Senior Officers from the Revenue Department responsible for disaster management in the state, Category II – Supervisory/Incident Command - District Collectors, Deputy Collectors & equivalent ranking officers, Category III – Field executives - consists of Mamlatdar / Dy Mamlatdar and other associates) were interacted with for getting insight into the subject matter. Importance of role of these functionaries in the state Disaster Management activities has been adequately covered under the chapter eight. Main questions explored included:-

- What respondent has felt about the adequacy of the DM policy, procedures and Origination?
- What respondent has felt about inter departmental / Organization’s coordination and information exchange?
- What they think about handling and managing 26 January 2001 earthquake and how managerial effectiveness in DM can be further improved?

Traditionally, attitude of Government officials remained conservative and they would not openly discuss and divulge Government functioning and it was very difficult to have them agreed, even to talk on such subject. Keeping the sensitivity of situation under consideration and to achieve a level of comfort with the Government officials – interview questions were, by and large, extremely flexible and round-about in scope and coverage. Respondents were encouraged to supplement as many inputs as they desired on the issue of emergency and disaster management in the state. Each session lasted on an average for 1 hour to 3 Hours. The responses were noted separately, were scrutinized, and analyzed.

**Questionnaire Survey – Its design, format and administration**

Questionnaire survey has been carried out to elicit information on wide range of issues as to get answers to research questions and to test the validity or otherwise of the research
propositions as well. In keeping with the scope of the research, questionnaire were meant for people (including Government officials) who were affected by 26th Jan 2001 earthquake in Bhuj District, Gujarat state, NGOs and corporate who were involved in one way or other in earthquake management and related works. Sample inputs from the school students from Gandhinagar and Ahmedabad were also collected to understand school preparedness and how students perceived it. Questionnaire was designed keeping information requirement in mind with a mix of qualitative and quantitative base. Questionnaire was framed in unambiguous terms and language understandable by a large cross sections of the society irrespective their educational level. Bilingual (English / Gujarati) option was given to the respondents for better understanding.

Case Study

The term “case study” has multiple meanings. It can be used to describe a unit of analysis (e.g. a case study of a particular origination) or to describe a research method. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident. Case study method is used to carry out this research. It is a qualitative approach. The motivation for doing this comes from the observation that, if there is one thing that distinguishes humans from natural world, it is our ability to talk. Qualitative research methods are designed to help researchers understand people and the socio-cultural context within which they live.

In questionnaire survey and interviews, the focus has been on the key issue of “organizational preparedness” including- effectiveness of emergency response at various geo-physical and administrative level (Village, Taluka & District), upstream coordination between district – state and national authorities, resource mobilization and deployment, public information management etc., where as in case of the case studies, focus is on the whole of the State Disaster Management system, the disaster management policy,
emergency action plan, resource planning & management, organizational arrangements, various initiatives, issues, problems, constraints etc. Two states have been chosen – Gujarat State (the domain of interest for proposal) and the California State (as Reference model for emergency & disaster management). Extensive field visits, interviews, personal observations, official documents were the main sources of collecting data and information.

4.11 Concluding Remarks

This chapter presents the Research Questions, Research objectives, Scope of the Research, and issues to be addressed. A Research Model has been conceived and Research Propositions have been derived. The Research Methodology and its implementation have been discussed. Findings from Case-lets, Domain Manager’s Group and questionnaires survey are dealt with in subsequent chapters.