Disaster-Related Project Management: An Organizational Perspective

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***Abstract*—This paper examines the problems faced by disaster management and relief organizations during handling different disaster-related projects. It focuses on the causes, and control and techniques adopted by different countries to effectively manage the disasters. Four different cases have been studied and analyzed to develop an understanding of issue faced by the organizations. Recommendations have been proposed for improving management policies. Findings of this research highlight the importance and need for coordination among different regional, national and international organizations to minimize the risks and vulnerabilities, and to ensure the availability of resources required for relief and rehabilitation.**

***Index Terms*—Disaster management, public project management, humanitarian agencies, disaster relief.**

I. Introduction

Generally, disaster is characterized as a happening that could be natural or human-brought. It could be sickness, a catastrophe causing injury or death, or an accident threatening to harm infrastructure, property or environment.

UNISDR, 2009 defines disaster as:

"A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources [1]."

Disasters are broadly classified into two categories, natural and technological. Natural disasters include hydro-meteorological disasters (e.g. droughts, floods, landslides, avalanches), geophysical disasters (e.g. tsunamis, earthquakes, volcanic eruptions) and biological disasters (e.g. plagues, epidemics, insect infestations). Technological disasters include industrial accidents (e.g. building collapses, chemical spills, radiation), and transport accidents (e.g. plane crash, or train, ship, road accident) [1].

Whatever nature a disaster may take, there is no denying that developing countries are more vulnerable to its devastating effects as they are not well prepared to tackle the issue head-on and alleviate its impact. It is virtually impossible to counteract the damages of disasters. No such policies exist that could set aside all possible disaster impacts, however reduction and mitigation efforts can be made by developing capacity for pre- and post-disaster activities and responses like developing early-warning systems, and being prepared for mobilization of medicinal, communication, rehabilitation, and reconstruction services [2].

Disaster reduction and rehabilitation related activities are expected from government agencies and NGOs. The systematic planning and organizing, and costing, and procurements required for these activities make it very similar to project management [3]. Although, the government agencies and NGOs associated with disaster management and relief activities work at provincial, national and international level, a lot more needs to be done in terms of better legislature, improved administration, coordination and effective management to minimize the risks faced from these disasters.

A. Background

Pakistan is geographically located in a disaster-prone area. Where a variety of landscape is a blessing for the country, it also puts it at great risk of earthquakes, storms, landslides, avalanches, dry season and floods. Pakistan faces floods after huge downpours every monsoon causing great loss of life, and property. Moderate to extreme earthquakes are a common occurrence in Pakistan. Earthquake of 8th October, 2015 is considered to be one of the most severe disasters leaving over 73,000 dead, 128,309 injured, more than 3 million displaced and penniless, 6000 educational institutes and 574 welfare workplaces destroyed.

This near-total destruction caused by the earthquake presented the necessity to establish a risk reduction and management organization to minimize the destructive effects of the disaster. Hence, National Disaster Management Commission (NDMC) along National Disaster Management Authority (NDMA) and Provincial Disaster Management Authorities (PDMAs) were established. In spite of all the efforts made by NDMA for disaster risk reduction, the core issues of disaster prevention, management and relief are still not being addressed completely. The deficiencies present in these organizations are noticeable at every level, provincial, national, and international.

When studying the disasters of the recent decades, like seismic tremor of Oct 2005, Hurricane Katarina and Sandy, Floods of Pakistan 2010 and 2011, it can be seen that despite of many local and global disaster management organizations, there is still a significant room for improvement.

B. Purpose

Although, disasters do not normally amount to the degree of destruction, human capacity to restrict the devastating effects of disasters is very limited. Disaster relief and management organizations at all levels, regional, national or international, are not sufficiently equipped to handle the disasters in isolation. It is not only difficult for these organizations but economically inviable as well. Therefore, a

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need for all such organizations to coordinate and time-share their resources, tangible or intangible, arises.

This study aims to understand the effects posed by disasters and the measures taken by concerned organizations to limit these effects from a disaster-related project management perspective. This study also discusses the shared advantages in collaboration and coordination of these organization at regional, national and international level for effective and successful disaster relief and management efforts. The study further recommends possible approaches for pre- and post-disaster project management.

C. Scope

This research is based on existing literature on project management aspects of disaster management and the documented post-trauma incidents. The study covers the in-depth analysis of best practices and policies, and support given by government, humanitarian and disaster management organizations to give recommendations for limiting the extent of destruction.

D. Research Methodology

This is a qualitative study carried out using quantitative data. Data for multiple natural disasters has been collected from organizations and experts involved in disaster related projects and activities. This study includes first-hand experience of the lead researcher in an active disaster relief project, 2005 Earthquake in Pakistan, for over a year and a half.

E. Hypothesis

Disaster management organizations working in coordination under one umbrella organization can be more effective and efficient in managing disaster related public projects.

II. Literature Review

A disaster occurs when mass level damage affects vulnerable populace causes damage exceeding their capability to recover. It is a combination of hazard, vulnerability, and deficient risk reduction efforts [4].

Risks on earth, whatever form they might be in, have been reported to increase as the civilization has advanced [5]. This increase in catastrophes add to the losses of developing countries a lot more than they do to developed countries. This is due to the limited resources and inability of developing countries to effectively handle these disasters as well as their location in high risk areas [6]. This high-risk area has a population of around 800 million [7].

Disaster management and risk reduction is a systematic effort of analyzing and managing causal factors of disaster to moderate exposure to disasters and create awareness among vulnerable populace [1]. UNISDR talks about five main stages of disaster management. These are prediction, warning, emergency relief, rehabilitation and reconstruction.

For effective disaster management, agencies and organizations exist at national, regional and international levels like NDMA of Pakistan and India, FEMA of USA, SAARC Disaster Management Center (SDMC), Center for Disaster Management and Humanitarian Assistance (Latin America) and UNISDR.

Projects are unique endeavors that have a beginning and an end [8]. This is true for disaster management projects as they also comprise of unique product and services and are temporary in nature. Due to these commonalities and the requirement for knowledge, skills, and tools, disaster management can be seen as public project management [9].

Some important disaster management frameworks employed in the past include Yokohama Strategy and Natural Disaster Reduction Decade. Yokohama Strategy was first formulated at World Conference on Natural Disaster Reduction held in Yokohama, Japan from 23 May to 27 May 1994 [10]. This strategy gave an elaborate action plan for management and mitigation of natural disasters. Years from 1990 to 2000 were pronounced as the International Decade for Natural Disaster Reduction in December 1987 by the UN General Assembly [11]. Its objective was to regulate international action to reduce the property damages, economic disruption, and loss of life due to the natural disasters like floods, droughts, earthquakes, tsunamis, volcanic eruptions, wildfires, insect infestations, etc.

At the dawn of the new millennium, heads of states and governments signed UN Millennium Declaration stating that they will ensure that all populace suffering in the aftermaths of natural disasters will be given all support and aid necessary for their protection, and that they resolve to strengthen the cooperation among the states to share the efforts in disaster reduction and management, and to assist the vulnerable [12]. Disaster risk, especially in developing countries, is increasing day by day. This increase necessitates the dissemination of information regarding disaster risk management to all [13].

In 2005, in World Disaster Reduction Conference, a majority of UN members adopted the Hyogo Framework of Action (HFA), a decade long plan aiming to secure the world from disasters. Strategic objectives of HFA include developing risk policies, institutions and capacity, making use of early warning frameworks, utilizing knowledge and education, and strengthening fast response systems for effective management of disasters [14].

III. Case Studies

To reach the end goal of effective organizational setup for disaster management, it is vital to see if the existing organizations have been proved adequate for the purpose or there is room for improvement. For this, four case studies of natural disasters have been selected. Two of these case studies are international level and other two are from Pakistan.

A. Tsunami of East Asia / Indian Ocean 2004

It is one of the gravest disasters that took more than 300,000 casualties. 18 countries around the Indian Ocean were affected by this disaster. Banda Aceh of Aceh province in Indonesia was affected the most in this tsunami. Despite being over a staggering 1500 kilometers far from the epicenter of tsunami, Sri Lanka has still not recovered fully from its effects. In the aftermath of this tsunami, disaster management authorities asked if this could have been anticipated, or the management and relief activities have been better administered and coordinated. The answer is yes, and yes. A number regional, national and global organizations

reacted to the disaster and did the best in their capacity saving numerous lives, but the rescue and relief efforts were not of the standard required for the severity of this disaster due to the lack of data accessibility, policies, adequate management and support, and bureaucratic hurdles.

Due to the destruction of the infrastructure, provision of relief was particularly a big issue. Inadequate use of IT resources and minimum or no coordination further aggravated the problems. Political conditions and bureaucratic hurdles came in the way of coordination of international organizations with local administration. Turf war and the scrambling of assets and resources between agencies without proper coordination did not help the matter either.

B. Hurricane Katrina

Despite being the most anticipated calamity, the havoc hurricane Katarina wreaked was massive. All levels of disaster management organizations, from local to national, were required to act. Several states of US received substantial damage to property and devastating loss of life. These states included New Orleans, Mississippi, Louisiana, and Alabama. Federal Emergency Management Agency (FEMA) received harsh criticism for its ineffective rescue and response services. FEMA, under National Incident Management System (NIMS) and National Response Plan (NRP), was to provide assistance for emergency management and relief [15]. When Hurricane Katrina hit, restructuring of how the government and emergency responders work preparation, recovery and response activities was still underway. This, along with the mismanagement, unruliness, and lack of knowledge significantly impeded the rescue process. Despite having the capacity and the resources, the US could not deal with such a disaster effectively.

One of the reasons behind the inability of FEMA to manage was its integration into the Department of Homeland Security (DHS). After 9/11, security focused on terrorism and the same idea seeped through to FEMA affecting the disaster relief activities. Instead of taking charge, FEMA went about their activities in New Orleans under their local administration. New Orleans spent USD 18 million for preparation activities. Though warning had been issued, efforts of disaster management agencies were insufficient for the imminent disaster. At the time, national guards could not help sufficiently either due to their deployment in Iraq. Lack of troops and manpower lead to lack of control and violence. FEMA acting like a bureaucratic agency, and politicians playing politics with the disaster relief and government aid necessitate an independent and self-sufficient disaster management organization.

C. Pakistan Earthquake 2005

8th October, 2005 is the day a massive, devastating tremor shook Pakistan. The tremors were felt in a number of neighboring countries and regions going as far as Bangladesh, with the mass destruction in northern areas of Pakistan. It was probably the biggest calamity to have hit Pakistan, taking more than 73,000 lives, and leaving 128,309 injured out of which over 70,000 severely injured and disabled. Nearly 3 million people were displaced due to the earthquake lacking sustenance and sanitation facilities. Areas with the most lives lost and property damages were North-West Frontier Province (NWFP) and Azad Jammu and Kashmir (AJK) [16]. Northern parts of Punjab province and the federal capital Islamabad were also affected.

Government, relief agencies and Pakistan Armed Forces reacted as fast as they could. Pak Army responded with at least 8 brigades aside from the ones already in the area. Aftershocks, however, significantly affected the rate of relief operations. Over 125 helicopters were operating in the affected areas to transport the injured and bring the supplies. Countless NGOs and other humanitarian organizations participated in the rescue and relief process. Nation's response in provision of aid was commendable. Whole country felt the pain of affected populace and donated liberally whatever they could for their aid. Moreover, international aid was requested and generously given. In total, over USD 100 million in donations was mobilized by the civil society and nearly USD 2.5 billion were pledged by the international donors [16].

Major issues faced by the rescue and relief efforts were due to the magnitude of disaster. Geographic location of the disaster contributed to the delay in aid. Communication problems, inaccessibility to resources, and unreliable data estimates for damages were some of the issues faced by the disaster management organizations. A number of organizations worked for relief but they did not share a central control or common agenda. Lack of storage capacity for massive inflow of aid from inland and international donors at PAF Airbase in Chaklala was also a problem. Lack of security for convoys carrying relief goods did not help the situation either. At the time of the Earthquake 2005, NDMA did not exist. Unavailability of dedicated resources and lack of specialized equipment for the rescue purposes made Pakistan dependent on foreign aid.

D. Pakistan Floods 2010

Geographical location of Pakistan and it being a developing country makes it prone to regular disasters like floods, earthquakes, avalanches, etc. Floods in Pakistan are a usual phenomenon. These are normally bought on by heavy precipitation and growing ice sheet melt. Indus River has been the source of 11 floods. In 1973, floods caused way over 1,000 deaths and over 3,000,000 houses destroyed. In 1976, 425 died while number of demolished houses due to the floods was reported to be 10,000,000. In 2010, Monsoon resulted in over 2000 deaths and affected 20 million people. 78 districts affected by the floods lost over 2.4 million hectares of cultivated land, 2 million houses, and 500 health clinics. Pakistan bore nearly USD 43 billion in economic losses and property damages. NDMA and Pak Army started the relief activities immediately. 800,000 people were moved to safe locations within 10 days and over 1.4 million lives were saved by the end of the month. Over 88 helicopters, 1240 vessels took part in the rescue operation. 5928 rescue camps were established throughout the country for the affected.

All this effort is undoubtedly remarkable considering the documented number of people helped and the relief provided. But, on a close look, management efforts look disappointing. Rescue and relief mission would have been a lot more effective if the operation efforts were standardized. Problems

faced in the relief process included the coordination issues between the numerous disaster management organizations working in the area. This lead to overlap in the affected areas of operating organizations resulting in duplication of efforts and excess resource consumption. Disaster management efforts still seemed incomplete due to PDMAs not being entirely useful and in majority of districts, District Disaster Management Authorities (DDMAs) did not exist. Due to the inadequacies seen in communication and coordination processes early warning, information management, and effective policy implementation had been compromised.

IV. Disaster Management Organizations

Disaster management includes tasks, measures and procedures like prevention and mitigation of hazard, coordination and capacity building, preparation, assessment, and prompt reaction to disasters, and effective evacuation, relief, reconstruction and rehabilitation activities [17].

Every country has its own disaster administration framework. After studying a number of natural disasters, the destruction and losses it caused and the relief efforts made, it is analyzed whether disaster management organizations are doing their maximum in their capacity or there are some issues that need addressing for effective management.

A. Federal Emergency Management Agency (FEMA)

Established in 1979, FEMA took under its umbrella a number of other organizations like Federal Insurance Administration, National Weather Service, Federal Preparedness Agency, and many others. Hence, FEMA's power and authority kept extending till it included counterterrorism as well.

Some key aspects of FEMA include fire services, coordination with other organizations at local, regional and national level depending on the extent of disaster, and 15 other response functions like law enforcement, health and medical, etc. FEMA does routine exercises to stay ready and prepared for any emergencies and disasters that might happen.

Issues FEMA faced in disaster management in recent years involve coordination issues with Department of Defense (DoD) in Louisiana, and with DoD and DHS in Hurricane Katrina. Interdepartmental disputes and issues of turf among authorities, inaccessibility of key authorities to situational data, problems concerning accessibility and provisioning of logistics, delayed reaction from DHS for relief operations of Hurricane Katrina, unavailability of trained staff, ineffective efforts to maintain order also contributed greatly to the issues. Deficiencies were seen in preparedness and experience of the staff. Government reaction and resource availability was inadequate given the time available after the warning of this impending disaster. All these weaknesses and the magnitude of the disaster contributed in the mismanagement of FEMA [15].

B. National Disaster Management Coordinating Committee (NDMCC) – Sri Lanka

Tsunami of December 2004 raised the necessity of a disaster management organization in Sri Lanka. National Council for Disaster Management (NCDM), and Disaster Management Center (DMC) control the disaster management efforts. NCDM established NDMCC to coordinate the disaster rescue and relief related activities of the relevant stakeholders [18].

NDMCC is responsible for social, economic, and ecological issues, assessment and evaluation for the requirements of disaster risk reduction activities, strategy formulated, and development and implementation of related policies. It works on donor resource allocation, easy accessibility to situational data, identification and prioritization of target for risk reduction activities, coordination of joint efforts with other organizations, monitoring and reporting risk and activity data at different levels, and documenting the best practices and lessons learned.

Issues faced by NDMCC include bureaucratic hurdles, turf wars with other organizations, inability to make independent decision-making due to NCDM, unavailability of committed resources for disaster management, and absence of and organizational setup for coordination with organizations at international level.

C. National Committee on Disaster Management (NCDM) - India

In 1947 after the independence of India, NCDM was initially founded with the objective of primary functions of relief activities like warning, medical and financial aid, rebuilding, and other logistic support activities. It was tasked to supplement the relief endeavors of the state. Now it incorporates other relief and recovery activities like rescue, relief, forecasting and contingency planning as well.

India is geographically located in a natural disaster-prone area with more that 57% area exposed to earthquakes, 28% to droughts, and 12% to floods. Key attributes of NCDM include contingency planning, management of emergency operations, early warning system, good financing policies, and developed incident command center. Like previously discussed organizations, NCDM also faces issues like bureaucratic hurdles, turf wars with other organizations, no committed resources and manpower, absence of independent decision-making, and the absence of organizational setup for coordination.

D. National Disaster Management Commission (NDMC) – Pakistan

Before 2005, disaster management strategies existed only for emergency relief and response activities. No formal organization or agency was established for disaster risk reduction and management. Emergency relief cells, crisis management cells, and other commissions were only formed for an active disaster to managed responsibility only after the disaster has happened. Constituted bodies like police, army, civil defense agencies, and fire services did the disaster management work. Earthquake 2005 raised the need for a regulating authority. In 2010, NDMC was established that worked to create a command structure, NDMA, for managing disaster rescue and relief related activities. NDMA is responsible for policy formulation for disaster relief and coordination at national level. At provincial level, PDMAs exist for strategy making and executing disaster management plans. At district level, DDMAs are also established. National Disaster Response Plan (NDRP 2010) covers all the relevant

activities like preparedness, warning and response.

After the establishment of NDMA, a number of disasters including the floods of 2010, 2011 and 2010 have been encountered. Despite developing the plan, rescue and relief activities were not very effective. Major problems faced were due to the lack of proper protocols resulting in ambiguities and delays. Not having a proper and dedicated organization for disaster management impacted severely in rescue and relief activities in Earthquake 2005. Even after establishment, processes and procedures did not mature enough before the floods hit. Structures for disaster management organizations for communication and coordination were not organized and systemized. Disaster management plans does not include media campaigns and Pakistan Medical Association. Less planning and absence of independent decision-making and control also contribute to the issues. Instead of army aiding the civil power, civil power aided Pak Army in disaster relief activities. Inaccessibility of data and information to different organizations, absence of central authority, lack of specialized equipment for disaster rescue, and untrained staff and no dedicated institutions for disaster management purposes played a big part in ineffective relief efforts.

E. Other Regional and International Disaster Management Organizations

Some other multi-national and global organizations for disaster management and relief include the following:

1) Asian disaster reduction center

It works to help impart the disaster management ability by gathering and sharing data regarding disaster risk reduction and doing research on multinational collaborations regarding for risk reduction.

2) Asian disaster preparation center

It works on planning and executing programs to reduce the effects of disasters by devising management strategies, capacity building, making arrangements for rescue, relief and rehabilitation, etc.

3) UN office for coordination of humanitarian affairs (UN OCHA)

UN OCHA works for quick relief by coordinating with and facilitating the government established disaster management organizations.

4) UN disaster assessment and coordination team

This team consists of a dedicated group of experts backed by UN member nations ready to render their services anywhere in the world in case of a disaster.

5) UN international strategies for disaster reduction (UNISDR)

UNISDR does organization and coordination concerning disaster risk reduction. It works for the development of a multi-partner framework for interorganizational coordination, and provision of data, knowledge, and information.

6) UN logistics support unit

This unit manages the quick dispatch of essential relief supplies in disaster stricken areas.

V. Findings

For effective management of pre- and post-disaster efforts, this study led us to the following key findings:

1) Better preparation and timely management of risks and vulnerabilities can stop them from turning into disasters. Early warning, and extra preparation and readiness in case of disasters that cannot be predicted can help in doing more in less time.
2) Developing nations are a lot more prone to disasters than developed countries due to unavailability of skilled manpower, resources for transportation, communication and relief, and proper planning. They also bear more cost of managing disasters due to the lack of awareness and management skills. Early warning frameworks are inadequate or nonexistent.
3) Research and study of past disasters can help in planning for resources pre-positioning and assets management.

Findings specific to Pakistan are as follows:

1) In Pakistan, no effective body for disaster management or concrete plans for disaster management at national and provincial level exists. Only quick reaction force is Pak Army for post-disaster management.
2) Coordination between media and disaster management organizations is nonexistent. Absence of information due to this is also a contributing factor in increased number of casualties.
3) Organizations giving little to no caution at all, or being extra cautious in relief endeavors can cause delays leading to increased number of casualties.
4) Politicians influence the relief activities by mismanagement of funds or influence prioritization order of areas for relief activities causing delays. Other local authorities involved tend to misinform when demanding for resources resulting in over- or under-allocation of resources.
5) No central control and organizations not following the chain of command also caused delays.
6) Authorities like Special Support Groups (SSG) and Provincial Relief Rehabilitation and Settlement Authority dealing with the situation of Internally Displaced Persons (IDPs) are of ad hoc nature and hinder the prosperity of NDMA due to the coordination issues.
7) Pakistan does not have the capacity to handle massive disasters like Earthquake 2005 and Floods of 2010 independently due to its economic situation.
8) All disaster management organizations depend on Pak Army to plan and execute the relief efforts instead of themselves being the first on scene. This causes them to be unprepared and underutilized.
9) Although NDMA has been established, no quick reaction taskforces have been formed.
10) A requirement for a forum for easy access and sharing of standard policies and procedures, best practices and lessons learned exist.
11) Interdepartmental coordination between Pak Army, NDMA, PDMAs, and other development authorities is missing at all levels.
12) A database containing complete information and documentation is required for sharing of detailed plans, pre-, during and post-disaster situation detailing losses and damages, rescue and relief guidelines, resources required and utilized, and complete record of manpower engaged in the relief processes for future reference.

VI. Recommendations

In light of the findings of this research, following recommendations are being proposed:

1) Information management system for easy access and sharing of required information related to disaster management should be created.
2) Participation at grass root level must be ensured far a holistic and effective approach to disaster management.
3) Establishing coordination at regional level can enhance disaster management capabilities and ensure quick response from international community.
4) Early warning and response systems can help significantly in reducing the effects of foreseeable disasters.
5) Centralized command system can ensure effective coordination, dissemination of information, and allocation of distribution of manpower and resources.
6) Competence development at all levels, especially upper management and team leads that are involved in planning and execution should be focused.
7) Effective coordination and communication within and in-between organizations is essential for effortless risk reduction activities.
8) Media must play a positive role in timely news reporting and flow of information.
9) Allocation of adequate funds and quick mobilization of resources must be ensured for on-time and successful completion of the rescue and relief activities. An amount in terms of the percentage of yearly budget should be allocated for disaster management activities.
10) General public awareness about the impending disaster and other drills and practices should be raised.
11) Volunteer services from all levels must be formalized for effective rescue and rehabilitation.
12) One significant weakness is deficiency of flying resources like helicopters. For disaster stricken areas, a framework for quick logistic management is required to transport supplies for rescue and relief, like heavy machinery, food, medicines, manpower, etc.
13) Equipment yards should be set up at areas close to the ones affected by disaster.
14) A need for formulation of construction laws specific to the areas prone to disaster exists like areas prohibited for construction e.g. slopes, earthquake resistant structures, etc.
15) Disaster management organizations need to be independent in their decision making to ensure minimal political influence.

VII. Conclusion

Forecasting natural disasters and their impact in advance is proved to be almost impossible. Inadequate response, resources, and ineffective management seems to be the reason behind this. There is significant need for capable and efficient organizations to manage such disasters. Detailed study conducted on the subject supports the hypothesis. After the analysis of Tsunami 2004, Earthquake 2005, Floods of 2010, and Hurricane Katrina, it is clearly visible that weaknesses in policies, strategies and coordination of disaster management activities exist that needs to be improved upon to decrease the property damages, and number of lives lost.

This research draws attention towards these weaknesses of disaster management organizations in light of their performance in the disasters of past decades. Issues are found in early warning, preparedness, lack of awareness, coordination and management skills, inadequate resources, ineffective planning, absence of quick action forces, political influence in decision making, no central control, and inaccessibility to data and information.

This research further recommends solutions like information management system, participation at grass root level, coordination, establishment of early warning and response systems, centralized command system, competence development at all levels, allocation of adequate funds, quick mobilization of resources, public awareness, volunteer services, need for equipment yards, and independent decision making for the issues identified in disaster management organizations.

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