Some Observations and Lessons Learned: Katrina, Wilma, and Iraq

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Abstract

This paper documents critical technical and managerial concerns encountered by one manager during restoration and reconstruction activities of U.S. Government installations and Iraqi oil industry facilities after natural and man-made disasters. The authors rely on personal observation and interpretation of activities and documentation for which they were responsible or to which they contributed, while serving in various project and program technical and management positions for a major international contractor performing within cost reimbursement contractual schemes. This observational technique may provide interpretations that are less reliable but more valid than those obtained by other research processes. The authors determine that best practices for this kind of work must include careful consideration of communication reliability and frequency, which are critical for adaptation to change; development of trust among stakeholders; prompt and accurate triage of facilities for work prioritization; well-planned logistical activity durations factored into the work schedule; daily cost reports; and realistic human resources replacement policies, especially for efforts of longer duration.

Keywords: disasters, restoration, reconstruction, conflict recovery
1. Introduction

Natural and man-made disasters seem to afflict our world more frequently and with worse effect as time advances. This is the logical outcome of a number of demographic trends and geographic conditions (McDonald, 2003). Learning to more quickly and accurately react to the emergency conditions enables recovery to commence sooner, and this can lead to reduction of time-dependent damages. It is the authors' impressions that much academic work focuses on design or planning to prevent or mitigate the effects of natural or man-made disasters and enable rapid emergency response. Such attention is appropriate. Obviously, however, even the best of such plans and designs sometimes fail, and substantial recovery efforts are required. In such cases the effort of private sector contractors is essential to major disaster restoration and reconstruction effort. Therefore, insights into sound management practices of contractors can be useful, both for contractors and for those who oversee contracted recovery work.

The words recovery, restoration, and reconstruction can sometimes be confusing in their application. When a major disaster occurs, it is typically government entities—fire fighters, law enforcement professionals, emergency medical technicians, government emergency managers, and perhaps the military—that respond immediately to control people and traffic for security and safety within the affected area; to search for and rescue victims; to stabilize essential structures against further damage; and to provide emergency resource allocation and oversight. The recovery phase commences after that disaster emergency response phase ends, when the immediate threat to life and major property damage passes.

Restoration and reconstruction begin with the disaster recovery phase. Restoration comprises the activities that bring structurally sound, economically repairable facilities back to pre-disaster levels of functionality and aesthetics. Timely response continues to be emphasized, since some facility systems may be restored at reduced cost by quick reaction and attention. Other restoration might be more deliberate and maybe last years into the recovery phase, although the necessary timeliness of some restoration actions imposes their completion to be scheduled immediately after the emergency phase subsides. When restoration is not practicable, facilities that are unsound, uneconomically repairable, and must be demolished might be reconstructed, if their functions are yet needed and affordable. Major reconstruction efforts after disasters can last many years.

It is in this stressful circumstance that adaptability to change, accurate and timely triage of damages, logistical planning, project controls, and human resource management sometimes take on a different and more urgent nature than common construction projects. The observations that follow derive from the lead author’s personal experience in such an environment. Informed readers should be able to adjudge the probable accuracy of the observations and conclusions induced, even if the reliability of the observations in all such circumstances is less certain.
2. Adaptability to change

Adapting effectively to change ensures that fluctuating circumstances do not overcome the capacity of people and their organizations to accomplish essential tasks, despite the imposition of unexpected demands on resources. Uncertainty about change is what complicates its management. Some possibilities can be anticipated and addressed by wise planning, but experience shows that other eventualities are surprising even to seasoned managers. Detailed, unexpected changes during the early stages of disaster recovery seemed more frequent than for non-disaster work. For example, after many houses were nearly restored, a U.S. Government contractor was told to immediately cease working on them and move effort elsewhere. That decision was sudden and totally unexpected. Some inefficiency was thereby exacerbated in the already resource-constrained circumstances. The toxic effects on operational efficiency and employee morale might have been moderated with better communication between the parties.

Good communication results in prompt and accurate exchange of information both up and down the supervisory chain in an organization and across stakeholder boundaries among owners, contractors, and consultants. Not surprisingly, electronic mail was especially useful, since all parties with a possible “need to know” could be apprised of likely or certain changes coming their way. Internet, e-mail, telephones, and other media can be provided in devastated regions on an emergency basis by satellite, until the more routine communication nodes are fully operational. Also, the communication effectiveness of traditional, face-to-face operational coordination meetings should be implemented in any event, but especially when electronic means are limited.

Besides communication media availability, the attitudes of those who communicate have much to do with recovery efficiency and effectiveness. Trust must be intrinsic to full and complete communication among recovery project parties. If trust is lacking, then so shall communication be inaccurate and incomplete (Rapp, 2009). Changes will be more abrupt and have greater adverse impact, if people are unwilling to keep each other informed, not only of what they are certain others must be told, but even of what they think others might need to know. One knows that bad news gets no better with age.

Recovery managers may deal with owners who can take the emotional impact of devastating losses and changes in their lives in easy stride. Then again, the owners they encounter in their work may be utterly distraught and barely able to discuss their losses and make the decisions that allow the contractor to proceed with essential recovery work. Restoration contractors commonly state that many homeowners, in particular, struggle to maintain composure. Much of their material wealth, including items irreplaceable despite insurance, is snatched from their lives. Recovery professionals must remain sensitive in their communication with owner-clients, or they and their work become the focus of frustration and irrational expectations. This can enable the victims of drastic, disaster-caused change to take change in stride with less difficulty.
3. Accurate building and facility triage

Types of damage that buildings and other facilities experience tend to vary with the causes and magnitude of disasters and the types of structure and construction that are tested. In many cases, the total destruction of buildings or other facilities is obvious. They require only assessment for material content for proper debris processing and disposal, before they can be fully demolished. For those buildings or other facilities that appear sound, leveraging the knowledge of owners or other occupants and employees greatly speeds the initial assessments of damages and improves their accuracy. All reasonable efforts should be made to consult owners about their buildings and obtain record drawings of their construction. In the case of mass regional evacuations, the lack of knowledgeable local people may preclude the contractor from conducting necessary technical inspections with desired thoroughness.

Recovery contractors should bring engineering expertise in abundance, planning to release from the project those who are not required after the initial, extensive inspection and prioritization of work sequence. Time is of the essence. The contractor’s experts recommend courses of action for the various buildings and facilities, and the owner-client must rapidly decide to accept or amend the recommendations. When the owner has its own experts, it is not uncommon for a reconciliation process to ensue. In any event, the owner should delegate decision-making authority about building disposition to its lead person “on the ground,” who routinely interacts with the contractor every day. The responsiveness of owner decision-making and the resulting permission for the contractor to act swiftly in some cases were different for Katrina and Wilma, due to somewhat different levels of decision-making trust placed by higher Government authority in their managers who directed the contractor.

Projects in war zones can be dangerous, so it is understandable that some engineers in the contractor’s organization may not wish to risk traveling to the work. To some extent, damage can be analyzed and designs can be conceived at a distance on the basis of detailed photographs and documentation from the project. This may be enough to restore simpler parts of facilities to acceptable functionality. Experience shows, however, that even the most conscientious efforts to restore complicated systems from afar tend to fail on the first attempt. There is much justification for engineers involved with complicated restoration to visit the site of the object of their endeavors. If danger causes them to shy from travel to the project, then they should not be assigned to the design team and allowed to charge time to the work. Only those designers with a “hands on” approach will likely be successful in forensic engineering, i.e., in determining with certainty what must be done to fix the previously damaged facility.

Public sector client-owners may have difficulty deciding their work priorities. Seasoned contractors can perhaps help less experienced managers in the client’s organization to determine and weight decision factors, especially those of a technical nature that are pertinent to robust and accurate work prioritization. This happens most effectively when the contractor learns the client’s needs and agenda. The understanding comes from forthright communication between the parties, and this is encouraged by mutual trust.
4. Role of logistics

There is a story of an American military leader insisting, "I don't know what . . . this 'logistics' is . . . but I want some of it," (Cox, 2009). Indeed, logistics is constrained and critical to restoration and reconstruction in the aftermath of a large disaster. The urgency of need and volume of necessary materials can be even greater than what is demanded during large-scale military operations. Although some definitions are more detailed, one might summarize logistics the same as did an anonymous source in the author’s notes: a system of people, equipment, and procedures that optimizes the delivery of materials to their location of use. Logistics has evolved into a discipline that touches far more than the military. Certainly all disaster recovery managers need to understand and apply sound logistical principles.

Delivering extensive quantities of diverse materials to their location of use in a heavily damaged region can be difficult. While general requirements might be anticipated, especially if good emergency planning has been performed, the devil remains in the details. Just as with triage, determining exactly what will be required to restore and reconstruct damaged structures and facilities requires time. Contractors must integrate the nuances of owners’ and users’ desires for the recovery effort. In many cases the requirements of non-owner entities that fund the recovery work, such as insurance companies or government agencies, must also be satisfied. Doing this promptly and thoroughly can be challenging, since the more stakeholders there are, the more complicated is a robust solution.

Normal channels of material procurement and delivery and their many related aspects, all of which can be viewed to comprise logistics, shall probably be severed by major regional disasters. Not all major retail sources of common building materials have highly dependable logistical systems for the volumes of materials required post-disaster. A project that one of the authors worked placed orders with a well-known retailer only to belatedly discover that assurances of performance rang hollow, and that the store managers could not forecast when deliveries would be made or what was on incoming trucks. Maintaining reliable services for small contractors during periods of normal demand proved much easier for the major home building supply firm than supplying a project of large scope, when demand escalated throughout the region after hurricanes struck. The wise contractor establishes multiple supply and logistical alternatives no matter how reliable a given source appears to be.

Even when construction contractors accurately determine recovery logistical requirements, proper information is not always transmitted reliably. Materials may arrive late, at the wrong location, in insufficient quantities, or with incorrect specifications. Those typical complexities couple with the abnormally frequent delays and miscommunications sometimes created by the restricted lines of communication of a disaster-stricken region. Timely delivery of enough correct materials to the proper work site is less certain, especially early in the recovery phase. Such logistical degradation was readily apparent after the hurricanes along the U.S. Gulf Coast, 2005, and in the oil fields of southern Iraq, 2006-2007. In the latter case, security and international dimensions created even more resistance than the normal operational “friction” that major restoration or reconstruction activities impose.
People often correctly admonish that materials-related tasks must be integrated into construction schedules, or the schedule is hardly worth the paper upon which it is written. Not only should materials delivery be incorporated into schedules, but also the durations of the activities should be realistic. In 2006 the lead author researched the scheduled and actual delivery dates of materials and services obtained by over 1,800 satisfied purchase orders (POs) for which he had program records. Some POs had been placed over a year before. All had been placed to satisfy requirements for restoring portions of the Iraqi oil infrastructure. Actual delivery dates often trailed originally scheduled dates. The author sought a factor that could have been routinely applied to all PO order-ship times to have assured a 50 percent probability of timely delivery of goods and services. Order-ship time is defined to be the duration from the date the PO is placed to the date the goods are delivered or the service is performed.

The necessary factor was calculated to be 1.4. That is, if every order-ship duration of the roughly 1,800 POs had been extended by 40 percent from its initial forecast, then 50 percent of the POs would have met their forecasted delivery dates. Greater delivery dependability would have required that a larger factor be applied. Will this same 40 percent factor apply to the median satisfaction of POs for other programs? Would there have been some factor required to achieve the median delivery forecast, anyway, even if not in the midst of an overseas conflict? Perhaps, but the investigation nevertheless provides some objective evidence that international logistical operations, especially those within regions of armed conflict, will result in delivery dates significantly extended from the norm. Assorted discussions with procurement and controls professionals of the program convinced the author that order-ship times would have been considerably more dependable under normal construction conditions. Expediting amended the delivery dates to reduce unpleasant surprises, but operational planning nevertheless suffered somewhat by the substantial delays of original to actual delivery dates.

Managers gave extra attention to materials whose procurement laid on the restoration projects’ critical paths, so their arrival was much timelier than the average. One understands, however, that delays of materials on near-critical paths can increase schedule risk, so attention must be given those POs. In any case, this analysis indicates the magnitude of delays that can occur internationally despite aggressive expediting. Informal review of causes of the delays exposed over-optimistic shipping dates from suppliers and unexpected intermediate transportation delays. All links in the chain of a project’s procurement and logistical system must be examined to reduce the risk of delays.

5. Project controls

Cost reimbursement disaster recovery contracts have been common. Some owners are reluctant to negotiate such contractual types, if a firm-fixed price contract can be agreed. Nevertheless, the nature of equitable risk-sharing between owner and contractor makes cost-reimbursement contracts viable, if the scope of work is uncertain. For firm-fixed price contracts the owner is concerned with quality and schedule, while the contractor manages costs to ensure a profit. On cost-reimbursement contracts, however, the owner must become deeply involved in cost control. Cost-reimbursement contractual provisions offering an incentive fee for control of costs can motivate the contractor to assume more responsibility for cost control. The owner then reviews costs to remain satisfied that all charged are allowable, allocable, and reasonable within the contractual terms.
Savvy owners demand that the contractor provide a cost report, which ensures a current account of costs incurred. A major concern for cost-reimbursement contracts is recurrently forecasting a reliable project cost estimate-at-completion, EAC, for the owner (Rapp, 2009). The owner must be prepared to curtail the amount and type of programmed work as the EAC approaches the limit of the available funds. A monthly or bi-weekly report during disaster recovery will be far too infrequent for the fast-paced nature of such work during the months immediately after recovery commences. Costs might escalate too much, too quickly for necessary changes during two or four-week reporting gaps. Instead a daily cost report is preferred in order that owners can best make timely and correct decisions to remain within budget. The reporting system that feeds such a document must be highly responsive and accurate. Unless the client requires something different, it might be better for a contractor to devise a disaster recovery reporting format than to try to adapt a more cumbersome format applied for typical, deliberate construction projects.

The characteristics of a readily adaptable report can vary, but the following simplified spreadsheet format offers an idea of what has proven useful in a cost-reimbursement environment with subcontractors paid under time and materials (T&M) provisions. A worksheet can be prepared by a contractor for each of its subcontractors, and then summarized with the contractor’s own costs.

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<th>Equipment</th>
<th>Hourly Rate</th>
<th>Daily Hours</th>
<th>Total No.</th>
<th>Daily Cost</th>
<th>Total Cost</th>
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<td>Daily Labor Sum</td>
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<td>Daily Total Sum</td>
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Figure 1: Daily cost tally spreadsheet report format

Initially, daily columns depict only forecasts of equipment and labor item hours and extended costs. These are synchronized with the scopes of work assigned and performance periods of relevant subcontracts and cost estimates. As each day passes, the forecasted numbers are replaced by actual numbers reported from the field. (The fonts of reported, actual numbers can be changed to preclude confusion with those that remain only forecasts.)
A cost reimbursement environment compels the wise owner and dutiful contractor to require that daily cost-related numbers be reported by separate channels, so that entries can be compared every day. This affords control and assures both parties that the report is probably accurate. The disaster recovery projects on which the author served determined a viable system by which to assure accurate cost reporting. Subcontractors reported to the contractor early the next morning all labor, equipment, and materials that they applied to the work the previous day. The by-name, detailed figures were sense-checked and tallied in the field, then forwarded to the cost control professional, who was also located at the project site. The contractor’s cost controller compared those values with work effort values documented and reported by contractor superintendents through operational channels. If the subcontractor’s figures agreed, then they were entered into the cost report that morning. Discrepancies that sometimes resulted were readily reconciled, and the final numbers and costs were reported to the owner-client by midday. Readily adding by spreadsheet the reported costs to-date (actual cost of work performed, ACWP) to the forecasted numbers to-go (estimate-to-complete, ETC) enabled the contractor to accurately update the owner-client every day about the probable total cost of the work, the EAC.

Smart contractors will manage client expectations effectively to ensure that clients expect no more reporting detail or accuracy than can practically be provided for the existing level of staffing. If the contractor permits clients to seek almost any type or volume of information that might be reported, then project control effort moves from a proactive, forward-looking perspective to a backwards-looking, reactive stance. This does the project little good. Even with a cost-reimbursement contract, the contractor should do all it can to get the owner-client to commit to an array of information they absolutely need for their decision-making. Then that and only that should be reported. Clients tend to discipline themselves to restrict increased reporting requirements when accurately apprised of the additional cost of the staff to meet their elevated demands.

6. Human resources policy

The intensity of disaster reconstruction operations places severe demands on the participants. A “12-7” schedule, 12 hours of work per day, seven days per week, is not uncommon. If that grind is sustained for long periods of time, the stress on those involved can be considerable and result in degraded job performance. Periodic rest and relaxation, R&R, periods are practically essential. It is the author’s opinion that professionals who work the extended hours, especially if at remote recovery locations precluding what might be a more “typical” life offering regular leisure, should be replaced after two years and maybe more frequently. Such circumstances would most likely be encountered in overseas assignments to restore or reconstruct large facilities.

Employees who have served the reconstruction effort well for extended periods should be “taken care of” upon departure and offered equivalent employment elsewhere, if possible. Even if other employment that they accept is unavailable, managers in this environment should recognize that some people need to be replaced, anyway, due to the long-term effects of a nearly unchanging and stressful work environment. Only the most disciplined professionals can recurrently perform tasks of the same type, with the same requirements, with many of the same people, at the same facility, for extended work hours over a number of years without growing somewhat stale and indifferent. It helps a
program to get new ideas and fresh blood into a long-term effort. Also, if staff members create relationships that become excessively “cozy,” then periodic replacement can help to control and discover fraud, deceitful reporting, incompetence, or other harmful behaviors.

Add to these other stressful conditions any psychological impact of working in a region of open conflict, and it requires little imagination to appreciate the added tension, and why an appropriate staff replacement policy is necessary. Presumably, a policy would be published at the beginning of a program to make planned replacement common and accepted. Published policies reduce perceptions of unfair, disparate treatment of employees and the degraded morale that can result. Unfortunately, as with other managerial concerns when their effects will be far ahead, the more immediate start-up needs of a new program or project will tend to trump the attention of managers. Therefore, the human resources office should promptly and proactively facilitate policy development.

7. Conclusion

The above lessons in disaster recovery management are among those that had substantial impact on projects in which the lead author participated three to four years ago. One cannot guarantee that they are reliable in all circumstances, but it is reasonable to expect that they are valid for the circumstances described. One expects that they can offer readers, especially those who have little experience in major disaster recovery efforts, some useful planning and operational insights about disaster recovery contract work.

References


