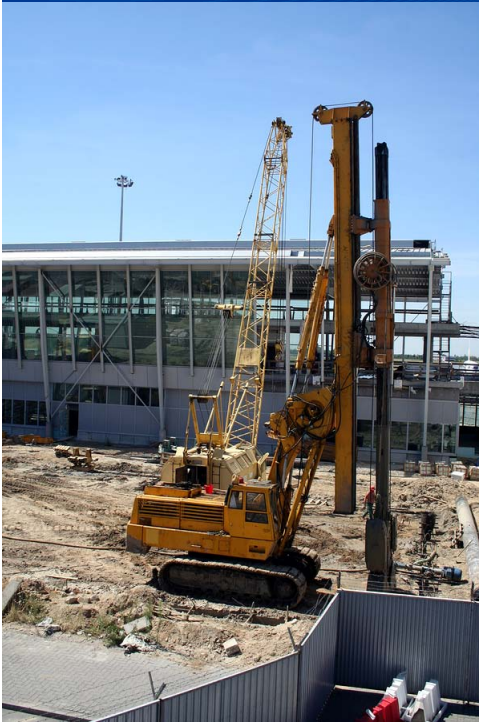




Changing the Face at the Busiest Airport in the World through Project Management

Refurbishing Heathrow Airport Terminal 1, On Time, On Budget, With No Disruptions to Travelling Public



Terminal 1 had been out of date and badly in need of refurbishment, with the 40-year-old building not seeing any significant updates since it was built in the 60s. With serious refurbishment going elsewhere at Heathrow Airport, as well as the upcoming opening of Terminal 5 and the introduction of international passengers to Terminal 1, it was in need of a major overhaul.

Background: Dated and In Need of a Revamp, But It has to be Business as Usual...

BAA Airports Ltd. was tasked with the refurbishment of Terminal 1, a 40-year-old building within Heathrow Airport, the busiest international airport in the world, whilst constantly keeping the terminal open to the 20 million annual travellers.

In 2004 BAA and the Star Alliance network, established in 1997 as the first truly global airline alliance to offer worldwide reach and seamless service to the international traveller, signed a memorandum of understanding that would result in Star Alliance moving into Terminal 1 at Heathrow Airport. Terminal 1 had previously been for short-haul European destinations only, but the introduction of Star Alliance meant that international passengers would now also be using the terminal.

This work was required to facilitate the move by a number of Star Alliance airlines who were moving their operations from Terminals 2 and 3 to Terminal 1. The successful completion of this project was the enabler for the complete transformation of Heathrow Airport that is used by more than 90 airlines, which fly to more than 180 destinations worldwide.

As well as a commitment to completing the project within a very strict deadline, health and safety issues were also a big concern given that the project had to be delivered within a live operating passenger terminal. Any interruption to the operation of the terminal building, and the stakeholders or passenger experience would likely result in delays for the airlines operating from Terminal 1 and as such, significant financial penalties for BAA. Public and media perception of BAA would not be enhanced should such a situation arise.

David Buisson, PMP, was chosen to lead the project. Mr. Buisson is a certified project manager with more than 13 years experience of managing complex and challenging projects by implementing the standards set out by the Project Management Institute (PMI®) through *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*—Fourth Edition. Under his direction, a team of professionals from a variety of backgrounds and industries tackled one of the most important transport projects in the UK, keeping it ahead of its European competition.

Challenges: Complex, Problematic and Large-Scale— A Project Manager’s Landscape

The project team had to resolve a large number of challenging and unexpected problems during the refurbishment, including asbestos in the ceiling and inconsistencies to the floor level.

It was also a complex and challenging project for the team because the work was delivered in 42 different phases, whilst remaining operational at all times. There was also a tight time schedule to deliver the project, which was marred by additional scope being added constantly and several delays from airline partners with regards to their move date.

In these circumstances, the project manager consistently referred to *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition for guidance on how to manage difficulties.

Human Resources Management

The People

Management of different people and teams on this project was quite challenging because of its scale and size. There were 11 top-tier suppliers who reported directly to the project manager, and dozens more who subsequently reported in to them, overall involving a very large number of workers.

Communications and time management would prove to be a challenge on a project involving this many different parties, especially because the project manager was keen to maintain a collaborative approach to problem solving.

The Planning

The large number of third parties working on this project potentially could have had severe repercussions on scheduling. If one contractor was late in finishing levelling the floor, this could delay the contractor that was scheduled to install the furniture, causing a larger knock-on effect throughout the project.

Cost and Procurement Management

Budget Changes

Budgetary reviews on the project meant that some major late changes were made on the project including some to the original plan with only four weeks to go. The original design for the installation of a “cladding” system above the ticket desks for BMI Airlines that would improve both the aesthetics and lighting for the area was deleted from the scope of works just four weeks before the check-in desks were scheduled to open. Upon learning of the decision, the project team was faced with an almost

“There were a number of factors associated with this project that made success a big challenge. Managing multiple stakeholders, suppliers, and contractors within a strict deadline and budget would ordinarily be difficult, but doing this alongside keeping the terminal continuously open for passengers was a huge issue that required strict planning and coordination, and the framework of the PMBOK® Guide was an invaluable resource for me to best manage all facets of this project.”

David Buisson, PMP, Project Manager

insurmountable task of finding an alternative solution that was acceptable to the various stakeholders and could also be procured and installed in less than four weeks.

Scope Management

Structural Challenges

A big challenge for the team was repairing damaged floor work in the terminal that was left when the building was initially constructed 40 years earlier. Repairing the floor potentially added an extra 21 weeks of work to the project. The floor in the East Linear face of the terminal was discovered to have been constructed from different materials to the rest of the flooring in the terminal. The floor was an uneven concrete surface instead of the regular terrazzo tiling, which to correct, would have added a significant amount of time to the refurbishment.

Technological Challenges

Information Technology (IT) proved another challenge in the delivery of this project because the team had to replace existing systems within the terminal building. This was a big challenge because it not only included standard office network systems, but also specialist flight systems such as Flight Information Display Screens, regulatory systems for passenger processing, and closed-circuit television.

Environmental Challenges

Completing this project sustainably and installing sustainable and energy saving measures were an important component in the refurbishment project. Given this was a renovation project and not the construction of a completely new building, installing truly sustainable features to save water for example, was very difficult in an old fashioned building.

Communications Management

Communications was also a big challenge for the project because there were multiple high-level stakeholders involved who had to be consistently updated each time there was a risk identified or when there was a change to the schedule or budget.

Risk Management

Key to the success of any project is risk mitigation, which is clearly outlined in the *PMBOK® Guide*. There were a number of risky tasks on this project which were essential to complete, and had they failed would have been catastrophic and could have resulted in the closure of Terminal 1. This would not have been a desired outcome from a passenger experience or public perception point of view.

“Risk had to be tightly managed and identified early on to ensure that a solution could be found before it turned into a major issue that would take the project off-time and off-budget. My knowledge and experience of using the PMI PMBOK® Guide meant that communications management was strictly adhered to and regular meetings.”

David Buisson, PMP, Project Manager

Asbestos Risk

A big concern for the team that could potentially have been very damaging was discovering asbestos in the ceiling. A number of the ceiling tiles in Terminal 1 were damaged and needed to be replaced, therefore the asbestos needed to be removed safely. Bearing in mind that 20 million passengers pass through Terminal 1 every year, the problem could not simply be solved by erecting scaffolding in these areas, taking down the damaged tiles and replacing them, as this would create a health and safety risk to the passengers and staff of Terminal 1. The agreed plan was to construct an air-tight floor to ceiling area in the roof void around where the damaged ceiling tiles were and extract the asbestos accordingly by a suitably qualified asbestos removal contractor.

Electrical Risk

Undertaking renovation works in a building that is 40 years old has inherent risks, and particularly so when electrical refurbishment is involved. It was discovered that the East Linear check-in facility required the installation of a new distribution board to meet the greater electricity demand. In installing a new distribution board the power to the entire terminal had to be temporarily turned off. This had never been undertaken in the 40 years since the building had been built and consequently there was little confidence that when the power was turned off all of the equipment would restart when switched back on.

An added dimension to this was that the distribution board in question provided power to the Central Search Area where passengers were processed through BAA Security, which is the main route to their departing aircraft. It was therefore critical that the project leaders got this process right otherwise the terminal would not be able to process passengers and may have to close down until power was restored.

Solutions: Mitigating Risk and Obstacles to Come In On Time and On Budget

There were a number of difficulties that arose during the refurbishment of Terminal 1 at Heathrow that had budgetary, scheduling, health and safety, and communications implications. This section examines the solutions that were used in response to these challenges, and the aspects of the *PMBOK® Guide* that were examined to support developing these solutions.

The People

Given the large number of stakeholders involved in the project, it was important for the project manager to ensure that all parties delivered the quality of work and level of standards that BAA normally expects. Consequently, a very clear mandate was issued to the plethora of third-



This large-scale project had to be delivered whilst remaining completely operational for customers—challenging enough in any circumstances, but this was particularly the case for Terminal 1 at Heathrow Airport given the fact that some 20 million people a year travel through the airport.

party suppliers and contractors involved to ensure that they followed a very specific framework for the quality and design requirements of the project.

Suppliers and contractors were able to fairly pitch for work on the project through a competitive tender process that ensured the best people got the job. A collaborative, non-hierarchical approach to human resources management was taken to ensure that maximum value was achieved and maximum knowledge extracted from the range of skills and professions contributing to the project.

As a commitment to the Project's Human Resource Management knowledge area within the *PMBOK® Guide*, it was agreed very early on in the planning stage of the project that to have an effective and coordinated delivery team that could respond instantly to the demands of this project, the main contractor should be located in the same office as the project team. The project team felt that with unexpected changes to the scope of work such as the floor, the team would be able to deliver most effectively by being located in the same place.

Additionally, weekly and monthly meetings were held with all suppliers to address any grievances, problems, or issues. When a problem did arise, the project manager would personally ensure that the issue was resolved quickly before moving on. Good communications and people management ensured that the project progressed smoothly.

The Planning

The key to managing the project was to strictly manage the individual contractors to ensure each small project was delivered on time.

Budget Changes

Budgetary commitments meant that a number of last-minute changes were made to the project. The project team and main contractor held a brainstorming session where one of the suggestions was to use hoarding panelling that had been used over the past 12 months for various other construction works. Approval for this proposal was endorsed by the relevant stakeholders and the cladding was duly installed prior to the required deadline.

The cost estimating and budgeting efforts during the early stages of the project were very challenging and, in particular, getting the balance right in terms of work that would be undertaken at night versus those in the daytime hours. This had a significant impact on the project budget as work undertaken at night is far more costly and productivity is lower.

Structural Challenges

Mending the floor whilst keeping to the project deadline was a challenge, given that other work was taking place simultaneously in the area. The



£6.3million worth of additional work was added without an increase to the original project budget.

team had also envisaged being able to use the area for storage. The project team met with the main contractor, terminal maintenance, and other contractors to discuss the issue of re-flooring this particular area and to develop a joint phasing plan to sequence the work and what areas would be protected for site storage of materials and tools. This was required to ensure that the unexpected re-flooring work was finished in line with the original time schedule for the East Linear Face of the terminal, and that it did not become a barrier for other works to be completed. Despite the prospect of a 21-week delay, the team still delivered on time.

Technological Challenges

In many ways, it was the IT behind the project that ensured that it was successful, delivered on-time, and delivered on-budget.

IT was an integral part of the Terminal 1 project because it allowed the project to be constantly monitored for problems by all parties involved. The IT team at BAA developed custom software for the project that incorporated an “Online Change Control” system that allowed any members of the team based on- or offsite to capture changes and send them online to the senior project manager for instant approval or rejection.

Given the large number of contractors working on- and offsite, the system proved crucial to the delivery of the project. If groups working offsite identified a problem for example with the budget, they could raise an issue through the specially designed software that would go directly to the project manager who could instantaneously approve/reject any requests. This saved invaluable time on the project and meant that work could continue with less delay than would have been previously experienced.

Environmental Challenges

BAA has a strong commitment to ethics in their Corporate Sustainability Programme, which is dedicated to improving design, construction, and integration and decommissioning.

Despite the challenges of updating a building from the 60s, the project team strove to incorporate sustainable changes to the lighting and heating.

Changes were made where possible including using energy saving bulbs throughout, and low-energy heating.

The Risks

Asbestos Risk

In response to the asbestos risk, the project team, including the Health and Safety officer, main contractor, and terminal operations team, reviewed all of the potential options and risks and agreed that the solution was to create an airtight area within the contaminated roof void that would not leak into the airport.

The use of this software played a vital role in communications management for the project, allowing the entire project team to have visibility of all activity on the project almost in real time, minimising time wasting or duplication of work. This was a part of the commitment to good communications between the team and allowed for easier access to the project plans.

Weekly coordination meetings were held to ensure that any problems or issues were picked up immediately and dealt with. Each meeting would examine a five week look ahead at the work schedule anticipating any future issues before they might happen. Project manager David Buisson would examine the top five risks every week with various contractors, visiting them onsite to determine a solution to the problem.

“This project was a huge success despite considerable odds against it. It was completed on-time, on-budget with no major problems and whilst remaining open to the public. The success of this project is due to excellent management that is borne out of a good grounding from the PMI PMBOK® Guide.”

David Buisson, PMP, Project Manager

A qualified asbestos removal contractor was then able to work within the airtight roof void area where the damaged ceiling tiles were and extract the asbestos. Once this work had been completed and air samples taken to confirm that the area was safe, the main contractor could remove the damaged tiles, replace these with new ones, and decorate them accordingly. This process was repeated a number of times throughout the terminal with no interruption to the passenger experience or terminal operation.

A big part of developing a solution for the asbestos problem was assessing and implementing project risk management. For this project, two primary risk management schedules were developed and maintained with one at a strategic/leadership level whilst the other dealt with the day-to-day risk factors.

Electrical Risk

Switching off all power to the old terminal building carried the heavy risk of the power not returning at all. The project team therefore convened a high-level meeting with all relevant stakeholders and the main contractor to discuss the issues and formalise a plan. Subsequent meetings were held with all of the interested parties to review the plans, risks and mitigation activities, roles, and responsibilities prior to the actual work being undertaken between the hours of 11 p.m. and 3:30 a.m. on 3 November 2008.

The output and results of the various meetings and discussions were captured in a formal process guidance document including all relevant technical data associated with this work. The meticulous planning ultimately proved to be a success when the power was turned off in the terminal building, the distribution board replaced, and the power restarted without incident or inconvenience to any of the areas impacted.

For every aspect of the project that involved any risk, risk schedules were reviewed, updated, and published through a formal review meeting held every month. In addition, the main contractor undertook the same process of risk management for its respective activities along with its key suppliers. Through this process, the top three risks identified in the risk schedule were escalated to the project board every month for elevation within the relevant business unit.

Results: Delivering Value and Efficiency Through the Use of the PMBOK® Guide

Heathrow Airport Terminal 1 was completed on time in September 2008. The project involved more than 500,000 working hours and kept within its £57.6 million budget.

- The project delivered on time and within budget despite the numerous problems that arose, especially the unexpected extra work that could have caused major delays to the project delivery.
- The project had a good health and safety record with no reported incidents, despite dealing with serious hazards like asbestos.
- There was effective team work between the numerous contractors, suppliers, stakeholders, and various support functions.
- All challenges were successfully met by the project team including £6.3m of unexpected out-of-scope work that was engineered into the final solution without an increase to the approved project budget.

References

Project Management Institute. (2008). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition*. Newtown Square, PA: Project Management Institute.

Hong Kong Natural Gas Pipeline

As one of the world's most populous cities, Hong Kong needs a consistent stream of clean energy resources to supply its 7.1 million residents with power. The city relies on a mix of fuels, chosen with an eye on reliability, sustainability and efficiency.

One of those energy sources is natural gas. Since 1996, Hong Kong's Black Point Power Station had drawn natural gas from the reserves of the Yacheng 13-1 gas field in Hainan, a nearby Chinese province. But those reserves had begun to deplete, and by the late 2000s, it was clear that CLP/CAPCO (a joint venture of ExxonMobil Energy and CLP Power Hong Kong) needed a new plan—not only to maintain a consistent supply of natural gas, but also to comply with the tightened emission caps that will be required by the Hong Kong Special Administrative Region (HKSAR) Government in 2015.

In 2008, HKSAR Government and Central Government of the People's Republic of China signed a memorandum of understanding on energy cooperation, which identified three new gas sources from which mainland China could supply gas to Hong Kong.

One of the sources is the Second West-East Gas Pipeline (WEPII), which is the world's longest natural gas pipeline. Stretching approximately 8,600 km, it starts in Xinjiang in China, where it connects to the Central Asia-China Gas Pipeline, and carries 30 billion cubic meters of gas from Turkmenistan to 15 Chinese provinces and regions.

Building an additional pipeline to bring WEPII's gas to Hong Kong by the end of 2012, however, would be no easy task and would require top-notch project management.

A HIGHLY COMPLEX PROJECT

Connecting the WEPII network from mainland China to Hong Kong presented numerous, complex challenges to all involved.

Regulations: Because it crossed the border between mainland China and Hong Kong, the project team had to acquire permits from both jurisdictions. The project had to fulfill differing practices and statutory approval processes between the jurisdictions.



PMBOK® GUIDE PRACTICES AT WORK

The project and program managers on the Second West-East Gas Pipeline Hong Kong Branch Line project had to handle enormous complexity. To accomplish the task of building a subsea pipeline in one of the world's busiest marine channels, they implemented a number of good practices outlined in the *PMBOK® Guide*, including:

- Effective planning
- Effective scope management
- Proactive quality monitoring
- People management
- Proactive risk and safety management
- Effective communication
- Effective decision making
- Effective stakeholder management

The result was a project that finished on time, with minimal environmental impact and zero reportable incidents or fatalities.

Communications: The various working teams used several different languages, and all of the parties involved had different requirements for documentation and reporting. The teams predominantly used English, Putonghua and Cantonese. However, they used English and Chinese for documents and PowerPoint presentations. The project team also had to manage a multitude of stakeholders, including over 30 authorities in both jurisdictions.

Environmental requirements: The project needed to fulfill stringent environmental requirements for the two jurisdictions. The project managers instituted a robust monitoring and audit program during the project execution phase, with intensive water quality monitoring, marine mammal monitoring and site inspections. Mitigation measures also included the deployment of silt curtains and limitations on working speed during marine dredging and jetting operations.

The groundwork: The actual laying of the pipeline was subject to many physical constraints. The project required a 20 km undersea pipeline through three shipping channels—Dachan Fairway, Tonggu Channel and Urmston Road—the latter of which is one of the world’s busiest marine channels. There were also challenges involving shallow water with a dredged marine channel, anchorage areas and an existing subsea pipeline and cables.



TIME-TESTED SOLUTIONS

To handle a complex project of this magnitude and to finish on time and on budget, the project team needed careful planning. Before project initiation, the team thoroughly planned, scheduled and engineered the project to ensure that it would work properly and, most importantly, that it would be safe.

The project had a tight schedule. To meet its deadlines, it implemented elements of waterfall methodology, where certain milestones had to be completed before the next tasks could start. For example, the channel dredging had to be finished before the pipeline could be laid. Proper planning, critical path monitoring, and close coordination between Hong Kong and China helped ensure the project finished on time.

Before laying the pipeline, the project team conducted an extensive marine traffic impact assessment (MTIA). They also liaised heavily with local marine and port control authorities to successfully work around the channel traffic, laying the entire 20km undersea pipeline in only six or seven months.

To further manage timelines, the project team tightly controlled the scope. Any changes had to go through a rigorous change management process, which kept everything on track.

The team also realized that communication was a key component to success. Project and program managers took special efforts to enhance their communication and to build effective teams. They established processes to always engage the right person for the right task and to encourage teamwork. Project and program managers also sought to provide adequate support for their personnel. And, given the different nationalities involved, all materials and discussions were in multiple languages.

The project managers also strove to enhance control and monitoring, with a focus on quality and safety. The project managers performed daily site visits, as well as scheduled and non-scheduled management walkthroughs, which were very effective in ensuring that the highest quality work was performed. There were also third party inspections done on critical tasks, such as the pipe welding, which earned a 100 percent acceptance rate.

SUCCESSFUL OUTCOMES

As a result of using the good practices and methodologies from the *PMBOK® Guide*, CLP/CAPCO finished the Hong Kong branch line of WEPII on time. The first gas arrived on 19 December 2012, and WEPII officially started supplying gas to Black Point Power Station for power generation in 2013.

The project was a remarkable success, with timely completion and a minimal impact on heavy marine traffic in the area, especially on container ships that are vital to the economy. In addition, there were no environmental incidents reported. And most impressively, the three million hours of pipeline construction went off without a single recorded incident.

Beijing | Bengaluru | Brussels | Buenos Aires | Dubai | Lelystad | Mumbai | New Delhi
Philadelphia | Porto Alegre | Rio de Janeiro | Shenzhen | Singapore | Washington, DC

PMI.org

Project Management Institute
Global Operations Center
14 Campus Blvd
Newtown Square, PA 19073-3299 USA
Tel: +1 610 356 4600 | Fax: +1 610 356 4647
Email: customercare@pmi.org

©2014 Project Management Institute. All rights reserved. "PMI", the PMI logo, "Making project management indispensable for business results" and "Pulse of the Profession" are marks of Project Management Institute, Inc. For a comprehensive list of PMI marks, contact the PMI legal department. BRA-109-2014 (04/14)



*Making project management
indispensable for business results.®*

World's Largest Gas Separation Plant Finished On Time and Under Budget

Samsung Engineering Co., Ltd. Uses Knowledge Areas from PMI's A Guide to the Project Management Body of Knowledge (PMBOK® Guide) to Implement Integration Methods in Construction Project

Background

In September 2007, PTT Public Company Ltd. (PTT) commissioned Samsung Engineering Co., Ltd. (SECL) to build the PTT Gas Separation Plant #6 (GSP-6) in Rayong, Thailand. The plant, which was valued at US\$630 million, powers Thailand's growing petrochemical, commercial, domestic and transport markets. In particular, the plant recovers ethane, propane, and other components from natural gas.

Samsung Engineering's project team handled the project management, engineering, procurement, construction and commissioning work on a lump-sum turn-key basis.



Samsung Engineering president and CEO Park Ki-Seok with PMI president and CEO, Mark A. Langley

Challenges

The project, which was honored as a 2011 recipient of the Project Management Institute Distinguished Project Award, faced substantial challenges. With approximately 300 tie-in points among existing plants within the PTT gas complex area, there had to be a large degree of sensitivity in coordination from the planning stage through completion.

Another challenge occurred in September 2009 when the Supreme Court of Thailand issued an injunction to suspend the GSP-6 project—along with 65 other projects in the region—for an environmental and health assessment. This resulted in an 11-month hiatus. All the while, Samsung Engineering was working on several other high-profile projects in Thailand that required extensive resources.

Solutions

The GSP-6 project team overcame these challenges by applying concurrent engineering techniques to shorten the engineering process, which enabled them to start construction early. Leveraging all nine Knowledge Areas from *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, the team also implemented the following integration methods:

- Combined the project teams from the GSP-6 project and other projects to minimize interfacing discrepancies, which are common when dealing with multiple adjacent projects.
- Integrated multiple construction contracts and subcontractors, including shared equipment, fabrication yards and manpower to increase efficiency.
- Integrated the construction workforce with the facility's operational staff to form a task force that allowed uninterrupted operations of the adjacent facilities during the construction period and during the pre-commissioning and commissioning phases.

Results

The GSP-6 project was successfully completed on 25 January 2011, on time and under budget, after 19,304,700 accident-free hours. The plant is now the largest gas separation plant in the world in terms of the number of production through-fractionation units.

Samsung Engineering cited project risk management, project communications management and project human resources management as instrumental in the successful delivery of this project. The techniques, processes and lessons learned from the project were recorded and reviewed to ensure the same best practices are applied to achieve success in future projects. With a strong foundation of PMI's project management practices, Samsung Engineering has been able to build a strong track record of projects in Thailand and raise its profile in the region.

"The project's ambitious timeline, along with challenges like resource shortages, working around existing plants and government delays, forced us to look beyond traditional project management practices," said Samsung Engineering's president and CEO, Park Ki-Seok. "With the help of PMI's standards, which led to successful implementation practices—particularly regarding risk management, communication management and human resource management—the project team continually surpassed expectations."

Case Study: Project Delays in Qatar Construction Projects

Ahmed Fouad Sedky *Southern Ontario Chapter* - March 21, 2016

Ahmed Sedky is the Director and founder of Integrated Consultancy Inc., a Canadian company specialized in Project Management and Construction Claims Consulting.

***Practice Areas: Construction**

As Qatar continues its race against time in delivering construction and infrastructure projects by the fixed deadline of 2022 (and later to achieve Qatar National Vision 2030), let's look at some best-laid plans gone awry, while exploring the causes and repercussions of project delays in Qatar.

Delays happen on construction sites everywhere in the world, and Qatar is no exception. According to PwC's "Building Beyond Ambition: Middle East Capital Projects and Infrastructure Survey" (June 2014), 95 percent of the respondents reported their projects had been delayed, with 45 percent saying their projects had been delayed by more than six months. Because of the collaborative nature of building works, there is always a chance of postponements.

In Qatar, with a large number of construction and infrastructure projects underway, project delay is an everyday reality. Irrespective of the causes behind the delays, the ugly truth is that many projects here find it hard to keep up with the initial plans for timely completion.

Over the past few years, Doha has seen postponements of many of its mega projects. Some of the most famous project delays recently include Hamad International Airport. After a series of delays, the project finally opened its doors in 2014 (the original completion date was set for December 2012).

Similarly, having missed revised completion dates repeatedly, the Sidra Medical and Research Center was expected to open in 2015. However, being four years behind schedule (according to local media reports), the project is still awaiting a public opening. Investors of Lusail City have reportedly expressed frustration over years of delays.

The Qatari construction market is one of the busiest markets in the region. The Qatar Railways Company has been officially recognized by the Guinness World Records as "The Largest Number of Tunnel Boring Machines Operating Simultaneously in a Single Project." In order to make the project operational by the 2022 World Cup, the company has procured 21 advanced tunnel boring machines (TBMs) operating across Doha to construct 113 kilometers of tunnels for the Doha Metro project. This marked a milestone for large-scale transport projects in Qatar and across the region.

According to a study published by the Project Management Institute in the April 2014 issue of *PM Network*, Qatar is expected to spend 156.8 billion USD (571 billion QAR) on mega projects by 2030. The scheduled construction in the Middle East during 2016 is forecasted to reach a value around 144 billion USD (524 billion QAR), while construction inflation in the region and Qatar could peak to a rate between 16 and 20 percent from 2016 to 2019.

To meet the requirements of this growing market, 20,000 to 44,000 workers would be needed per 1 billion USD spent. The figures include consultants and managers. Considering Qatar's reliance on foreign workforce, PMI's study further reveals that 69 percent of Middle East CEOs say access to skilled talent poses a potential threat to growth.

Similar to labor, the majority of building materials in Qatar are imported from abroad. Doha's old port's limited capacity is another issue that concerns construction contractors here until the new Hamad Port is open for operations.

However, Terry Tommason, Faithful+Gould's regional director for the Middle East, is positive that the issue will soon be resolved: "Once planned capacity comes on stream in 2016, the flow of essential construction materials will become less susceptible to delay and demurrage costs as well as alleviating pressure on the existing and congested Doha Commercial Port and MIC Port."

These are just a few of the many challenges in Qatar's construction industry. Put them together and you will find all the ingredients responsible for potential delays on construction sites here. In fact, according to Meed Projects, as of August 2014, 20 percent of the construction projects in the Gulf Cooperation Council were on hold, while 24 percent were cancelled. This meant that projects worth 89 billion QAR were on hold in Qatar, while those worth 107 billion QAR were cancelled.

According to PMI, in 2012, 80 percent of projects in the Middle East were delayed, and nearly half of the projects were behind by more than six months. When there is a delay, there is bound to be an extra cost because of factors such as hired manpower, equipment rentals, increasing material cost and extension of third-party services.

It is then no surprise to find that 64 percent of Middle East capital projects ran over budget in 2012. Expressing the same concern, Ibrahim Jaidah, CEO of Arab Engineering Bureau, tells QCN, "The magnitude and complexity of current and planned projects is a historic record for Qatar. Some of the major concerns for any project developers are inflation and meeting deadlines."

Causes

Apart from those mentioned above, projects can be delayed for an endless number of reasons. Looking from a main contractor's point of view, there are external and internal challenges that could keep the project from timely completion.

The internal challenges are related to the performing contractor or his subcontractors. In my experience, some of the major internal issues leading to delays include:

- Lack of good resources on the contractor's or subcontractor's team
- Lack of sound planning and execution
- Late mobilization of actual required resources
- Unwise cost-saving decisions on part of the contractor or subcontractor
- Lack of adequate market knowledge, especially in terms of regulations and permit requirements and procedures, and procurement constraints
- Unwillingness (or lack of motivation) among staff or labor to complete the job; this could sometimes be a result of less or no job security in the future

While the internal changes are in the control of lead contractors who can fix the issues (given the right approach and strong will), there are some externalities that go beyond the scope of

contractors. These external challenges are mainly related to the client and geopolitical or environmental circumstances. Major external challenges include, but are not limited to:

- Inadequate or unbalanced contract between client and the main contractor
- Discrepancies in contract documents, including specifications and drawings
- Country regulations and constraints
- Difficulties in getting approvals from clients or third parties
- Unclear scope or requirements
- Change in day-to-day regulations in the country, such as commute times for trucks
- Availability of resources, human and materials, in the region
- Availability of funding, which according to PwC's survey is the fourth major external challenge

Repercussions

Regardless of the cause behind a project delay, end users and contractors are the most affected stakeholders. The former especially suffer in the case of service projects, such as hospitals, transportation project, schools and power plants. The struggle of parents to get their children to good schools is a growing concern. Similarly, road reconstruction or construction often entails diverted traffic and overcrowded roads, lengthening the commute time of road users until they can enjoy the upgraded facility.

If a large-scale project is repeatedly taking 13 months to complete the work assigned for 12 months, its stakeholders should be concerned. For contractors, the impact is mostly financial as the client or employer applies liquidated damages while the contractor suffers from prolongation costs.

Linked to this are legal complexities. The contractor has to submit claims, go for arbitration or use the alternative dispute resolution mechanism mentioned in the contract. This, however, is only applicable in case of legitimate, excusable delay. Once again, legal consultation adds up to the project expenses and requires resources that could be utilized on other projects. On top of that, legal procedures are usually time consuming.

A delay often means that the contractor is not fully utilizing the resources that could otherwise be commissioned on other projects if the project had been completed in time. If the contractor is relying on limited resources, the delay on one project can also postpone the follow-on projects as the latter wait for resources. This is especially true for specialist manpower carrying out technical tasks and special cranes for heavy lifts or special lifts.

Remedies

Before working on solutions, it is important to understand what is considered a serious delay. "Delay" is a subjective word, and it is even more true for construction with long lead times, usually depending on the scale of the project.

Theoretically, a project completed even a week after its scheduled date of completion is delayed. What, then, is considered a serious delay? This again is a debatable issue since there is no fixed formula to define a delay into categories. The complexity of the project is a defining feature, pronouncing its delay as crucial or insignificant. However, as a general guide, a month per each year of planned duration is a really serious delay.

Stated differently, if a large-scale project is repeatedly taking 13 months to complete the works assigned for 12 months, its stakeholders should be concerned about the progress, and hence take necessary action to expedite the process.

Once it is established that a project is facing delays, it is time to take corrective action. In certain situations, the issue can be easily resolved by investing more money into the project. For instance, increasing the number of resources or paying extra for airfreight can recover the delay, but this is not always the ideal case since it is not cost effective, and could still not solve the issue.

In other cases, one has to go back to the drawing board to find the root cause and then come up with a solution. This usually is a case where delay comes due to an engineering or technical issue.

If the delay is due to a third party's influence (such as the ones linked to permits or approvals by authorities or end-users, which are not under the control of the contractor), the client's interference can solve the issue. Convincing the client to take such a step, however, needs to come from the contractor. According to Vasanth Kumar, CEO of Arabian MEP Contracting, "Any delay in receiving approvals and payments will seriously affect project progress."

Ultimately, communication is the key remedy to avoid delays. Openness, frankness and early problem solving can avoid a domino effect on the project. This can be achieved by making sure that all project requirements are clear, and all stakeholders' requirements are captured and reflected in the contract, which will lead to reducing the variations orders in the future.

Similarly, the contractor's execution plan should be clear, feasible and assessed by the performing organization and the employer for feasibility. In short, all involved parties should work as one team with a single goal of achieving the project objectives.

Both contractor and client should keep an eye on anticipated risks. When an issue has been identified, all parties should work together on solving it without entering into a blame game. This can only be achieved through honest discussions across the board with all stakeholders involved.

The advancement in technology has digitalized the construction industry too, but it cannot undermine the importance of supervisors and engineers being on site. Closely monitoring the project's progress helps in defining a realistic date of completion instead of the dates arrived at under pressure.

It is also important to have a smart approach toward work. A smart mindset would avoid overtime, understanding the fact that making the staff or labor stay longer on site will affect their quality of work in the future.

Lastly, in case of a dispute stemming from project delays, contractors should leave the legal battles to legal teams and focus on achieving the project objectives, while simultaneously trying for early dispute resolution.

Project Failure Case Studies and Suggestion

Nilofur Abbasi
M.phill Business
Administration,
Kinnaird College
Lahore, Pakistan

Iqra Wajid
M.phill Business
Administration,
Kinnaird College
Lahore, Pakistan

Zahra Iqbal
M.phill Business
Administration,
Kinnaird College
Lahore, Pakistan

Fareeha Zafar,
Ph.D
University of Derby,
Currently Working in
Govt. College
University Lahore
Pakistan

ABSTRACT

In this research paper three different case studies are taken under consideration. Step by step all three cases are described. These cases are about projects which had to face failure. Therefore, the reasons for failure of projects are identified and recommendations are given to ailing failing projects.

First case study is about British Petroleum which is oil and Gas Company had to face situation which was not just critical but new for any oil company. The incident occurred due to explosion in the deep-water horizon while BP technical staff was trying to drill a well. Moreover, BP was not able to stop oil flow for three months.

Second case is about Chrysler and Fiat. Both were automobile companies and had to face failure. Marchionne was the one who saved both companies. The main focus of this case is merger of these two companies and the challenges faced by CEO due to organizational change after merger.

Third case study is about Millennium Dome, one of the controversial projects in the history of construction projects because of number of reasons. With the help of case study we will be able to learn the causes of failure of this project. Further recommendations to ailing failure are given.

Key Words

Project Failure, British Petroleum, Chrysler and Fiat, Millennium Dome, Success.

1. INTRODUCTION

Before we start focusing on the main topic, it is vital to clearly understand some core terms/definitions.

2. PROJECT

A project is a mode of organizing resource. It is a group of individuals who are assembled to execute different tasks on a familiar set of objectives for a distinct period of time. Projects need a leader who can identify the work objectives and criteria for success and recruit staff from all relevant areas of proficiency.

2.1 Key Reasons for Project failure

Most organizations have experienced projects that did not end on time, were over budget, or changed in scope over time. There are many pitfalls that can sink projects. Here we will focus on some basic reasons why projects fail.

- **Lack of senior management**

Senior management must prioritize requirements and make decisions. If any person is not actively involved in a project, that project is doomed for failure.

- **Unclear Project Objectives**

Most organizations have more opportunities and project initiatives than they can ever hope to fulfil. Many companies

embark upon more initiatives than they probably should, causing over worked and often unhappy team members.

- **Scope creep**

Scope creep is a serious issue in many projects. Scope creep means an increase in what you have to deliver, without a corresponding increase in resources or an extension to the project timeline.

- **Gaps in communication**

Once a project is in full swing, a common issue is communication. Most project teams use email to communicate about their projects and tasks. The biggest complaint here is that project communication resides in each individual's email box. So, if a new resource joins the project, there is no centralized view of the project history.

- **Lack of visibility of all projects**

A common reason why projects fail is related to visibility. All three tiers of the project team, executive management, project managers, and team members, need access to the right level of information at the right time.

3. SOME OF WORLD'S MAJOR PROJECT FAILURE EXAMPLES

After analyzing these examples we will be able to come up with widespread conclusion with the lesson we learned from these project failures.

Here we are going to do in- depth case study of world's top most oil industrial market leader project failure

3.1 Case Study: British Petroleum

In today's dynamic and ever changing situation have forces the business organization to adopt and implement the new strategies as it is necessary to survive in the ever changing and competitive environment. In this case study we will analyse the situation of BP Oil Spill in Gulf of Mexico situated in United States of America. This oil spill results in a situation which is not only critical but also new for any oil company in the world[1]. As this deep oil spill accident was one of the worst disasters ever cost in the history of modern era. Such situation required some extremely crucial strategic management decisions. In the end we will discuss about the strategic management that can lead to a better solution of the issue.

3.2 Background of BP

British petroleum (BP) founded in 1909 as the Anglo-Persian oil and gas company headquartered in London England, United Kingdom. It's a sixth largest O&G company by production and fifth largest company by annual revenue [2]. Its major field of operations are exploration, production, refining, distribution and marketing of the hydrocarbon products. BP operating in over 80 countries of the world

having over 80,000 employees. Its largest division is operating in America under the name of BP America and it's the second largest oil and gas production company in the United States. It has 22400 service stations selling about 5.9 million barrel per day [3]. It is one of those oil and gas companies who have invested heavily for the invention and adoption of new exploration technology to find petro chemical under the earth surface.

3.3 Problem

April 2010, in the region of Gulf of Mexico situated 52 miles southeast of the Louisiana port of Venice an explosion occurred in the Deep-Water Horizon project. This explosion cause the oil spill which was one of the worst ever oil disaster in the history of the modern world. This incident results the loss of 11 worker's lives. The fire caused the clouds of smoke covered 30 miles area while the 5 miles radius around the rig was contaminated by the spill oil [4]. The situation changed so rapidly that the well head remains open resulting in substantial amount of oil spill eliminating the aquatic life of the region with estimated death tool of 8000 animals. After many unsuccessful attempts BP was able to cap the well on 15 July stopping the oil flow.

The Deep-Water Horizon was 9 years old unit specially designed for the offshore drilling. It was a massive floating structure with the capability to operate up to the 2400 meter deep and its drilling capability was 9100 meter. The structure was manufactured by the heavy industry department of Hyundai. BP was using this semi-submersible drilling unit by leasing it from Transocean from March 2008 to September 2010.

BP took the period of three months to completely cease the oil flow into the ocean on 15th July but up to this time 4.9 million barrels of oil which is approximately equal to 780 million litres has been spilled into the ocean. During the span of three month almost 210,000 gallons of hydro chemical leaked on daily basis in Gulf Ocean. This oil spilled caused the adverse effect on the eco system which disturbed the 40% sea food supply in United States [5]. The US Government was quick to response and Obama announced \$20 billion fund as a response to cater the environmental disaster. BP also acknowledged the situation admitting that it will pay for the cleanup cost. Over 30,000 people worked across the coast to collect the oil, took primitive measures to save the lives of animals but unfortunately disaster was so critical that the effect of spill still effecting the environment [6]

3.4 SWOT Analysis

Table 1 Swot Analysis of BP Oil Spill

<p><u>STRENGTHS</u> Strong market appearance Financially strong Company Technological Advantage Largest producer Product quality Brand loyalty Diverse geographic experience</p>	<p><u>WEAKNESSES</u> Negative Consumer opinion Poor Management</p>
<p><u>OPPORTUNITIES</u> Territories expansion Energy alternatives High quality and competitive pricing</p>	<p><u>THREATS</u> Legal threats Arab spring In appropriate measures Limited resources</p>

3.5 Reasons for Project Failure

- Extreme geographic location
- Weak risk management
- Lack of timely decisions
- Sluggish response in critical situation
- Undermining the situation
- Lack of planning

3.6 Recommendations for British Petroleum

- Before starting any project the employees must be trained according to their job responsibilities so that they can perform their duties correctly.
- Line manager and upper level manager must work ensure that all the quality standards must be fulfilled.
- A company must place adequate number of expert on every project who can work with skilled workers and can guide them in order for successful implementation of project.
- For any project there must be clear hierarchy so that in any critical situation the decisions must be taken as quickly as possible.
- The accuracy of all electronic equipments used in the project must be verified after periodic intervals.
- For the projects located in remote areas the must be some fast transport resources that can be used in case of emergency so minimize the loss of life of employees.
- Organization must develop a culture where employees can understand their responsibilities and the potential risk of making wrong decision.
- Main causes of project failure are mostly due to difficulty in performing the critical task so proper standard operating procedure (SOP) must be defined for such tasks.

4. CASE STUDY: CHRYSLER AND FIAT

This case study is about automobile companies. Details are described below.

4.1 Background of case

Chrysler and Fiat are auto-mobile companies. Chrysler's best assets were its Jeeps, minivans, and light trucks. Fiat's expertise was in small car technology and fuel-efficient engines, the very thing that Chrysler lacked.

Chrysler merged with fiat on June 10, 2009. Marchionne became CEO of the company. In 1998 Chrysler merged with Dailmer-Ben. But this merger was not successful one. In 2007 Daimler sold Chrysler to Cerberus, a private equity firm but again Cerberus was not able to save company from failure.[7]

In the past Fiat was at loss and Marchionne was the one who saved the company from failure. Now here we will find out what changes a company has to face while merger? How the leader handle these challenges?

4.2 Organizational Change

Organization change refers to managing different changing aspect of the organization such as physical environment, introducing new technology, alteration in mission, business process and policies, change in management team, merger, reengineering etc. When the change is significant and primary experts call it organizational transformation.[8]

4.2.1 Causes of organizational change

Companies face numerous situations during the process of change which leads to anxiety and ambiguity. In order to become a prosperous organization, it is imperative for the companies to incorporate upgraded technologies for producing goods, innovative products to be introduced which are anticipated by the market, modern methods of administration must be executed along with improvement in the expertise of the workers.[9] Companies must be capable of coping with all dimensions related to the reforms. The companies who get accustomed to change are able to boost their revenues and being appreciated as well.

The management must be competent to deal with all the aspects which influence their companies. Alterations in the companies are driven by the following internal and external elements prevailing in the environment;

- Political, technical, economical and societal enticements prevailing in the outer environment of the company can bring change in the *external environment*.
- On the other hand, the policies, styles, systems and procedures adopted by the company's management along with the behaviour of the workers influence the *internal environment*.

4.3 Merger as a part of organizational change

4.3.1 Merger

A merger is a combination of two companies to create a new single company.

4.3.2 Reasons for merger

There are numerous reasons for companies to merge. Mergers provides firm with facility to maintain their market position. It also provides facilities to companies to combine itself with other to strengthen itself and work more effectively and efficiently. Company can progress by using new technologies and innovation and using resources of successful Company. There is no guarantee that merger will be successful. [10]

4.3.3 Cultural Aspect of merger

Culture plays vital role in merger and it can be reason of failure or success of merger. Fiat and Chrysler merger was a cross-border merger so we will look at cultural aspects of merger with respect to two different countries.

4.3.4 Cross-Border Merger

Cross-border merger is combination of two companies of two different countries. Cross-border M&A is defined as an activity in which an enterprise from one country buys the whole asset or controlling percentage of an enterprise in another country. [11]

4.4 Corporate Culture

Corporate culture is the building block of an organization. It's combination of shared values, beliefs and behavior of the group. It's a way through which things are performed in

organization. Corporate culture is shared by the leader and gives its people the direction to move towards achieving company's goal.[12]

4.4.1 Cultural Differences between Chrysler and Fiat

Fiat was an Italian company and Chrysler was American. After merger the company faced culture difference described below:

Table 2: Difference between American and Italian Corporate Culture [13]

American Corporate Culture	Italian Corporate Culture
<ul style="list-style-type: none"> • In America there is <i>transactional culture</i>, meaning "task" typically comes before relationship. Legal documentation is involved in it. • It is rule-based. Rule-based cultures, as the term implies, tend to play by the rules, no exceptions. Rule-based cultures typically follow the rules even if it means putting a strain on personal relationships with friends or family members. • Americans tend to be <i>low-context communicators</i>, meaning they tend to value saying exactly what they mean. 	<ul style="list-style-type: none"> • Italians, on the other hand, are typically <i>relationship-oriented</i> cultures, meaning that "relationships" come before tasks. Business is done on bases trust and relationship. • It is situational. Situational cultures, on the other hand, will treat people differently based on their immediate individual situations, and the relationship that one has with that individual and their situation. • Italians tend to be <i>high-context communicators</i>, meaning they do not typically express ideas. Thus, create ambiguity.

Keeping view the dissimilarities between Italians and US-Americans, it can be judged that these dissimilarities will pose issues for all the stakeholders since such dissimilarities make themselves evident in every phase of the day to day work liaison ranging from management of project, planning of meeting to tactical planning . The purpose is to maintain the influence of cultural dissimilarities in order to lessen the errors and misinterpretations at the time of enhancement of essential benefits. The only way to achieve success is to offer adequate training in order to acquaint the leadership, employees and management with various cultures so that all can work in harmony.

4.5 Managing organizational change and cultural difference

From above information its clear that organization culture and organizational change are inter-related. While merger organizational change takes place and in our case study it's mentioned that after merge the CEO of the company changed now he has to manage the change and develop a corporate

culture which will be suitable for employees. Although accepting change for an employee is very difficult. Mostly employees are reluctant to change. Now we will find out how change can be implemented and what strategies can be used to manage it so that it can be beneficial for the company.

Change is not one-time occurrence but it is ongoing reality. Effective change management is part of larger workforce management, which focuses on improving overall performance of business to accomplish desired goals. It's the responsibility of the top leader to bring an effective process and awareness of effective behavior change throughout the organization.[14]

Furthermore, the leaders have the responsibility of inducing willingness in the workers to acknowledge the change throughout the organization.

- **Senior leaders** have the duty to commence, advice, and support the process of change. They must assure that all the workers have the complete know-how of the process of change throughout the company. They must also ensure accomplishment of the activities and develop suitable reactions to change.
- **Middle managers** are responsible for assisting the change and guiding their workers to comprehend the motives behind the change and how to become accustomed to this change.
- **Employees** have no role in making the choice on change that is why they might require guidance to develop policies to deal with the expected confrontation towards change. It is possible through workshops, evaluations and group discussions. Moreover, the workers must comprehend the motives behind the change, their part and how they can add to the procedure.

The leaders must make sure that the workers have defined roles and accountabilities along with the authority so that they could induce required variations in the tasks assigned to them.

5. CASE STUDY: THE MILLENNIUM DOME

Third case study is about millennium dome. Given below is the brief history about this dome.

5.1 About Millennium Dome

Millennium Dome is a Dome shaped mega structure, built in the Greenwich peninsula in south east London. It was designed for the celebration purpose at the time of third Millennium. Third millennium is a time period from January 1, 2001 to end of December 31, 3000.

At the time of construction it was considered as the mega structure in the world with respect to its size the Dome has a theme park and a scientific exhibition both which is entitled as the Millennium experience.

The Millennium Dome closed on 31st of December 2000 because it failed to attract the number of visitors which was expected to visit the place and results in many financial problems. As a result the Dome has been sold and converted into a sports arena. [15]

5.2 Background of the case

It was an achievement for opening a Millennium Dome on time. Initially this Dome attract a number of paying visitors but eventually this number decreases so much that it beaten

the record of visitors in 1999 in England. This Millennium Dome is a fully funded project and it has been funded by three sources that is national lottery, visitors and sponsors.

During its operational year the company has faced many financial problems. One reason is of decrease in the number of visitors. In order to deal with these financial problems company has done a number of changes at senior levels, like in year 2000 the company's chief executive, finance director and accounting officers were replaced with new ones.

The company's solvency issue was a matter of concern throughout the year and it was solved at the end. [16]

5.3 Reasons for failure

- **Lack of vision:** The project was not properly planed; they were unclear with the scope of the project. The original plan was to transform the Millennium Dome into a soccer pitch for use of one the teams of London but in the end none of the teams seems interested. At the end the British Government decided to find the appropriate buyer because the cost of maintenance was too high, it was reported to be £1M per month. [17]
- **Poor execution:** poor execution cause lacklustre content resulting in negative experiences for visitors and the resulting negative PR stemming for those experiences.
- **Criticisms:** Initial reaction from the press was poor. Lack of content, themes and creativity were the common factors of criticism.
- **Lack of sufficient operational expertise:** The Company lacked sufficient operational expertise. Running such a major attraction called for specific operational expertise quite distinct from that required to construct the Dome.
- **Poor marketing strategies:** Marketing and sales strategies were based on the Dome selling itself. Poor marketing results in shortfall of sales tickets. The company's marketing budget in the business plan was originally set very low as compared to the large visitor attractions. As there were no competitors so the company's estimations about building a good reputation only with word of mouth and sales tickets was not enough to attract the new visitors.
- **Financially mismanaged project:** It was financially a mismanaged project which was failed to attract new visitors. Throughout the planning and construction phase the cost raises which results in more and more dispersion of money to dome's builders. [18]
- **Lack of contingency plan:** Due to lack of contingency plan they were failed to manage expectations.

5.4 Recommendations for Millennium Dome

Millennium Dome is a unique project. Following recommendations with respect to Project management are given below.

5.4.1 Management structure

- Management structure includes that the entire project related tasks are properly defined, who reports to whom, what interaction patterns should be followed. What is the communication style, motivational techniques for employees.
- Project manager's answerability and responsibility related to project should be clear, focused and straightforward.
- Organizational structure and management's ability should integrate to meet the requirements of the project that is to plan, build, run and close.

5.4.2 Project costs

- The projects should only proceed if they are clear with full life cycle assessment cost of the project.
- Risk analysis of the project is necessary so that a project manager should understand the cost which could arise in the later stages of the project and prepare a plan for it.

5.4.3 Project income

- Project planning the most important phase in the life cycle of the project. Resources like time and money is used at this time. Projects like in Millennium Dome where the success of the project depends on the number of visitors, the project manager keep in mind the uncertainties related to this type of income. This can only be done with the help of careful and practical assumptions.
- to make realistic decisions about likely visitor numbers, and put in place effective marketing, the timetable needs to allow for a reasonable period for the development of a clear vision of what the product is and a fully thought through pricing strategy.[19]
- While working with financial sponsors like in this case of millennium dome it was funded by three sources so project manager working with financial partners must estimate the risk associated with financial contribution and discuss it in the project planning phase.[20]

5.4.4 Contingency planning

- If plan A does not work or there may be any changes so plan B should always be there to help the project to run smoothly.
- Projects which depend largely on trading income, and when there is risk attached to that income, it is important to be flexible at time of responding if the trading positions become worse.
- Managers find it difficult to respond at times when there are situations which were not easily predictable unless and until they have already developed a crisis plan or contingency plan at the time of project planning phase.[21]

5.4.5 Financial management

- All expenditure commitments such as expenditures that a company has committed to spend over a period of time in a project should be recorded on central tracking system so that all the invoices received against that commitment should be

recorded properly. This will help you to identify all the expenditures and total liability at any time when needed to check the financial position of the project.[22]

6. CONCLUSION

With the help of three different case studies of projects failure we have come to a conclusion that project failure is preventable with good project planning. When a project starts to fail there are techniques to recognize and trained Project managers minimize the extend of project failure or recover the failed projects as early as possible. So project manager needs to be trained in such techniques so that he/she not only recover the failed projects but also reduce the chances of failure. By following these techniques as discussed in the document you will enhance project's chance of success.

7. REFERENCES

- [1] Achenbach, J, BP's cost cuts contributed to oil spill disaster, federal probe finds. *The Washington Post* 2011, September 14. http://articles.washingtonpost.com/2011-09-14/national/35273061_1_transocean-macondo-deepwater-horizon
- [2] Goldenburg, S, BP oil spill blamed on management and communications failures, *The Guardian*, 2010, December 2. <http://www.guardian.co.uk/business/2010/dec/02/bp-oil-spill-failures>
- [3] Shankleman, J, BP oil spill caused by management failure, says White House commission, 2011, January 6.
- [4] Sandman, P, Risk communication lessons learned from the BP oil spill, 2010, September 13. <http://www.psandman.com/col/deepwater4.htm>
- [5] Wearden, G, BP oil spill costs hit \$40bn, 2010, November 2, Retrieved February 3, 2013. <http://www.guardian.co.uk/business/2010/nov/02/bp-oil-spill-costs-40-billion-dollars>
- [6] Beard, E., Hannan, M., & Hayward, P, After the Spill. (Cover Story). *Parksand Recreation*, Pg 38-45, 2010
- [7] Barry Shore "Project Failures From the Top Down: Can Marchionne Save Chrysler" project smart, 2009, June 18.
- [8] Carter McNamara "Basic context for organization change". <http://managementhelp.org/organizationalchange/basics.htm>
- [9] Cliff Notes, "Causes of organization change". <http://www.cliffsnotes.com/more-subjects/principles-of-management/managing-change/causes-of-organizational-change>
- [10] Randall S. Schuler and Susan E. Jackson "HR issues, activities and responsibilities in mergers and acquisitions" School of Management and Labour Relations, Rutgers University New Brunswick, NJ, USA.
- [11] Rong Zhang "Cultural Integration in Cross-Border Mergers & Acquisitions" University of Twente, 2010, November 11.
- [12] Joanne Mowat, "Corporate Culture", The Herring Group.
- [13] Nicole Barile, Chrysler & Fiat: Understanding Intercultural Differences, Challenge for Cross-Border Business? Global business mobile talent.

- [14] Deborah Schroeder-Saulnier "Organizational Effectiveness" Responding to Change With Agility: The Leader's Role
- [15] Long span structures Architecture Week, 26 March 2003
- [16] Hellman, Louis (26 June 1997). "Letter: Millennium Tent". *Letters to The Independent*. Retrieved 29 June 2009.
- [17] "House of Commons Hansard Debates 13 November 2000". *Commons Hansard Debates*. 13 November 2000. Retrieved 29 June 2009.
- [18] "Stephen Bayley on the rebirth of the Millennium Dome". *The Observer*. 24 June 2007. Retrieved 29 June 2009.
- [19] Sir John, 2000 National Audit Office report, 9 November 2000
- [20] "Four Documentaries – Abroad Again in Britain". BBC. Retrieved 10 August 2011.
- [21] "Dome woes haunt Blair". BBC News. 15 February 2001. Retrieved 31 January 2007.
- [22] Paul Mitchell. "World Socialist Web Site." (27 June 2000). Why London's Millennium Dome Has Been a Disaster

Construction Safety: An Integral Part of Project Management

Edwin Rivera Sierra - January 10, 2011

Practice Areas: [Construction](#)

When it comes to safety in the construction industry, opinions vary. Some believe that designating safety inspectors or consultants is just an excuse to increase the head count, whereas others believe that safety personnel delay the project's progress and are a road block. Some skilled workers and supervisors consider that safety representatives are not skilled or knowledgeable in construction and, therefore, do not understand why a task has to be executed in a certain manner. But is safety just another job or is it a real project management need?

Each project has its specific risks, which all depend on the type of work to be done. There are two ways to learn about the need for safety enforcement on any job, either you learn from history or you learn from personal experience. When planning a construction project, you will learn that safety provisions will be required as part of the process for any task. As a project manager, you are the one called on to lead the project's execution planning phases.

Are Safety Procedures Needed for Every Project?

Are the above statements about safety and its representatives true? Have you ever had an accident in your home while doing repairs due to the improper use of a ladder? Imagine someone taking an extension metal ladder outside his or her home while repairing the roof's eaves and forgot that an electrical power line feeds into his or her home. All of a sudden, while on the ground, he or she slides the ladder over without lowering the extended section. If this person hits the electrical power lines, he or she could be killed. If accidents like these were filmed for a movie, and we could play the movie back, would you still think safety is unnecessary? Of course not! This person would have appreciated if someone could have reminded him or her about the electrical power lines and explained the proper use of ladders, correct?

Experienced safety representatives can help make your construction site safer; they do not have to be skilled construction workers, just skilled in safety and ready to advise on the risks involved during any type of construction project. Once you learn the hows and whys about working safer, then you can apply them.

Resisting Safety Comes with a Price

When I was in my late teens in the 1970s and, later on in the early 1980s, I worked as a combination pipe welder in the construction of a nuclear power plant in the United States. At times I would get upset when a safety representative would come up to me to inspect or question my work methods. Once I ended up in the project's personnel office to complain about how a safety inspector treated me, and you know what happened? My argument did not stand! Although the safety inspector had poor people skills, I was in non-compliance with the safety rules and had a negative attitude toward safety. Have you ever had a similar experience and, subsequently, learned an important lesson?

During my tenure in the construction industry, I have learned the importance of safety. I learned many lessons from working on the nuclear power plant project, and one of them was when a co-worker got his wrist caught between two 6-inch beveled pipes we were fitting together. His wrist was slashed open, which shocked me. The accident was investigated and it was revealed that we had used improper working techniques and were not paying full attention. At that time, I wished a safety representative had caught us, because maybe then the accident could have been prevented, not to mention the guilt of knowing that we could have avoided this situation.

That experience was just the beginning of a continuous learning process. I've seen workers in accidents in which they had fractures that exposed bones, wounds caused by the improper use of tools, as well as many near misses, and one death.

In the early 1990s, I was part of the management staff when one of our construction workers died after a one-ton structural steel beam crushed him. One afternoon, while working on the construction of a cement-processing plant, after this employee placed the nylon slings around two structural steel beams, he stayed under the load while the crane was lifting the steel. One of the steel beams slipped off the slings; he heard his coworkers screaming to alert him, but by the time he realized what had happened, it was too late to run away from the falling beam. He looked up. The flange of the beam had hit him across the mouth and knocked him to the ground; his head was crushed between the beam and a steel grating that was lying on the ground behind him. I heard the emergency call over my radio and ran to the accident scene—it was very gruesome and extremely sad. Although this employee had been instructed on how to work and protect himself while lifting structural steel beams, the accident was a strong indicator that he had not fully understand what had been explained to him. Rigging two steel beams together was a great risk, because steel against steel will slip, but, sadly, this worker was new to this field. His direct supervisor should have taken a stronger position in this matter and ensured that he clearly understood the risk before allowing him to work unsupervised.

That was the worst day of my 32-year career in the construction industry and a day I will never forget. The project manager had to face the reality of this accident and he needed to ensure safety was better enforced in the future. After this accident, it was apparent that more safety support was needed on the project site. The company paid compensation to the worker's family and his direct supervisor's reputation in the industry was tarnished.

The lessons I have learned from this experience: regardless of the size of the project, safety always comes first! You will never "graduate" from learning about safety—it is a life-long learning process. As a freshman in the construction industry, I personally experienced a few accidents: an eye injury, burns, a crushed finger, and I survived the explosion of a 55-gallon drum full of "black chassis" paint fumes. Have no doubt: I've learned my lesson. Accidents do cost time and money!

You Cannot Plan a Construction Project without Planning for Safety

As a project manager, you must include safety as part of the execution process plan. Remember that two of the five Project Management Process Groups are Planning, Monitoring and Controlling; and one of the nine Knowledge Areas is Project Risk Management. A safety plan and strategy need to be aligned to the construction plan and become integral parts of it. The client needs to make sure that a proper contractor safety qualification process is carried out before considering prospective project bidders. Then, during the bid process, all of the contractors need to receive a copy of the client's business

“safety program.” The construction contractors need to ensure they have their own written “safety program” as well and submit a copy to the client during the contractor qualification process and also once they have been chosen to execute a construction project. A safety lead representative must be involved in this full process.

Both safety programs need to be reconciled in order to be useful and serve their purpose of preventing accidents. The client can give a separate safety initiation to the contracted workers before they begin work or there can be joint efforts, whereby both the client and contractor give the initiation talk to all those who will participate in the construction process.

Something very important to consider is that the construction schedule prepared by the contractor needs to incorporate all critical activities that require previous evaluation from the construction site safety representative and/or the client’s safety representative. These activities are, but not limited to, demolition, excavation, structural steel erection, welding, equipment lifting and rigging, confined space entry, electrical connections to main “powered” panels, tie-ins to in-use process piping, high altitude work, paint, and epoxy works.

A good project manager makes plans for each piece of his or her project and he or she includes safety as part of the plan. The success of a project should not only be measured by cost, time, and quality—safety also needs to be incorporated into the equation. If we analyze the dimension scope-time-cost-quality that a project manager needs to control if safety is not integrated as part of the project plan, then time spent because of incidents and accidents will represent a loss of project progress time and money. If these two important elements are impacted, the project manager will risk reaching the project’s expected goals. As a project manager, make sure you incorporate time and money in your project’s plan for managing safety.

Who is Responsible for Safety?

Safety is the responsibility of all who work on a construction project. We cannot expect only one or a few safety representatives to look out for dozens or even hundreds of workers. Once the on-site construction effort has begun, safety responsibilities are, but not limited to, preparing a project-specific safety plan, project-task pre-planning, training workers and their supervisors, supporting the evaluation of critical tasks, advising when safety issues arise, and performing periodic inspections, which can include full-time, on the job inspectors. But, as a team, all foremen, general foremen, supervisors, superintendents, project engineers, and the project manager need to support safety. They all need to ensure proper implementation and enforcement in order for all workers to comply with all safety rules and regulations, as well as to look after their site construction personnel’s well-being and this should be done following the proper “chain of command.” In the end, the project manager will be held responsible for the outcome of the project, so, it is extremely important for the project manager to work closely with the safety department and its representatives and support each other as much as possible.

One piece of advice to the contractor and client: the project manager cannot control the safety department or its representatives. They need to have the empowerment to ensure safety is applied without bypassing or letting some risks slide just to accelerate the project. I need to emphasize here that the project manager and the safety lead representative need to work as a team. No one person should try to control the other, but they do need to have open discussions and sort out issues without causing significant delays to the project progress.

The safety representative (in addition to being well versed in safety) needs to know how to deal with people. This can be a difficult aspect of his or her function. I've seen all types of safety representative personalities—some are too tough, others are too nice. Both extremes do not help much. If you are too tough, you will have many issues and problems to deal with, and if you are too nice, some workers with bad attitudes will not respect you; so, you need to be firm, but polite (and politically correct). You need to develop the art of reasoning with those who do not understand or have a different point of view and at times, you'll need to stay firm and act accordingly when someone does not follow the rules. One piece of advice for safety representatives: never get into an argument with the workers—go to their supervisor, and if they do not respond, go to the project manager, and if he or she does not respond, continue your way up through the chain of command, even if you have to end up at the vice-president's or even the president's office. Most importantly, if there is a serious risk that is not being corrected, press the "red panic button" and stop the task at risk. This is one of the main reasons why safety needs to have empowerment, because it can save a worker's life!

The Real Value of Safety on Any Job

"It's better late and safe, than early and hurt." Someone may think that taking the time to evaluate critical tasks, install lifelines, or barricade areas in risk can delay the start of a specific project activity, thereby impacting the project's progress. But if time is not invested in the evaluation of critical tasks and the preparation of a safe work environment, what will happen if an accident occurs? Do you really think you will complete the task or even the project on time? Depending on how critical the accident is, your project can even be closed down for investigation, which is how time and money will be lost.

The events I witnessed during my teenage years (when my co-worker slashed his wrist, and later when an employee was killed by staying in a dangerous situation) are examples that illustrate how planning for safety is so important. You must estimate within the project's duration an allowance of time for safety management (or risk management). Also, never let shortcuts fool you into doing critical work without the proper safety evaluation and clearance procedures. I've heard project managers use this expression: "I have calculated the risks." Well, if it is done with a safety representative's support, then great; however, if safety was not involved, a risk is a risk, and the only way you can calculate it is by allowing a safety professional to do his or her job. Never take risks by calculating them on your own, even if you are the one to execute the task, much less if you are sending one of your workers to perform this task. In construction, as in any other job, teams are formed to support each other based on their expertise. So, do your part of the job, but allow others to do theirs as well. The most important factor here is that at the end of each day, every worker can go back home to his or her loved ones in good health.

Conclusion

No job is exempt from safety awareness or following its guidelines, not even small tasks. Even in your own home you can have an accident. You can slip in your tub; fall by incorrectly using a two- or three-step home ladder; bang your head when you bend down in the kitchen and forget to close the upper door cabinets; or, you can be electrocuted by working with electrical equipment or devices without being a certified electrician or by not taking all the necessary precautions. Never think that accidents only happen to others but not to you. If you disregard safety and common-sense principles, you are bound to have an accident wherever you are (at work, home, or on vacation) and no matter what you are doing. If you understand this well, then you know how serious it is to have the right attitude toward safety

at work. The value of having dedicated safety representatives looking out for the safety of any project and teaching workers the right way to do tasks assigned to them can protect you and those working with you. The bottom line is that if you take safety seriously and see it as an integral part of your responsibilities, others will look up to you as a fully responsible project manager. Also, by integrating safety into your project plan, the probability of delivering on time and staying within budget will increase.

About the Author

In December of 2009, Edwin Rivera Sierra and his construction project team received from their Safety Department at AstraZeneca Pharmaceuticals, Inc., and the company president, an "Excellence Award:" "in recognition of your outstanding performance in SHE (Safety, Health, and Environmental)/Security and your contribution toward achieving 2009 accomplishments."

After Mr. Rivera finished the third year of his civil engineering education, he decided to change his major and complete his bachelor's degree in construction management. Before obtaining his college degree, he studied architectural and mechanical design drafting, and after receiving his college degree, he took an electrician course. He has worked for various well-known international and local construction companies in the United States and Puerto Rico. Mr. Rivera worked in the project engineering section of AstraZeneca Pharmaceuticals, Inc. in Puerto Rico for 12½ years, where he managed capital construction projects for three plants.

Wearing "hard hats" as a contractor (seller) and as a client (buyer) has been a great learning curve for Mr. Rivera. He has worked in the construction and maintenance of nuclear, thermo-electrical, and co-generation power plants; water re-use, cement process, chemical, and pharmaceutical plants; as well as office buildings, roads, car parking lots, a bridge, and other projects (e.g., homes). Throughout his career, he has held the following positions: construction manager, project manager, construction management consultant, senior project controls and construction supervisor, project controls analyst, project control specialist, mechanical superintendent, project coordinator, general foreman, foreman, and combination pipe welder.

In 1992, Mr. Rivera co-founded a new "plant services division" for a local mechanical and electrical contractor who has been servicing Puerto Rico for nearly half a century. Mr. Rivera's overall working experience in construction projects exceeds 32 years.