

Project Management: Challenges & Lessons Learned

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Project management involves coordinating various aspects of a project in order to bring forth a positive result. This coordination can include elements such as personnel, materials, procedures and facilities. Over the past five to ten years, there have been increasing challenges faced by Project Managers. Within the last decade, the Inventory of Major Alberta Projects lists a total of \$128 billion in projects recently completed. With multi-million dollar projects being approved by the Alberta Energy and Utilities Board on a regular basis, many based on oil and gas exploration and refinery, the challenges facing today's Project Managers are bound to be formidable. Some of the aspects of project management that are particularly challenging are quality, cost and schedule. There are various other mitigating factors as well; influences that Project Managers do not have control over. Sometimes these external factors can have as much impact on project management as the factors that Project Managers can control.

The first aspect of project management that can be problematic is the area of quality. From the point of view of the owners of a project, quality can be a challenge. The owner representatives (sometimes also referred to as the client, if construction is being managed by a third party) tend to spend the bulk of their time on stewarding to the managers. This means that the representatives may not be focusing on quality nearly as much as they should be. In reviewing the Lessons Learned following a major project in Northern Alberta, it was noted that quality assurance and quality control should be managed by the parent company, not by a contractor or other third party. It was also determined that the parent company should review and approve job specific construction contractor quality plans prior to the work being started. Another key lesson that was

learned is that lump sum work (which can be a significant portion of overall project spending) should be held to a higher standard of quality control than reimbursable work. This standard should be communicated throughout the bidding process and in the Contract Terms. Sometimes during the latter stages of project engineering, the contractor can be eager to start construction. It has been recommended that contractors be reigned in until engineering is truly complete prior to starting construction, in order to minimize re-work and other such issues. Also, once construction has started, contractors need to be reminded that any field engineers that they use must liaise with the project engineers prior to any engineering changes being made. This creates consistency between what was planned and what actually takes place in the field.

It is also important to note that wherever the project is taking place, all project and field engineers need to be professionally qualified and familiar with the local standards and codes. Some things change by nation, others change by province, and yet other standards change depending on municipality or county. In order for engineering to be as accurate as possible from the start, professional qualification and familiarity with local codes and standards is essential. If a parent company intends to outsource the engineering of a project to another location, some sort of formal training or education sessions may be necessary to ensure that the contractor is familiar with all codes, standards and project procedures.

The second area that many Project Managers are challenged by throughout the life of a project is that of cost. In some cases, projects are started out with misinformation, because the project estimate is made to appear lower than it would be in reality, in order to get final project approval. In order to maintain a more accurate picture of project costs

“from cradle to grave,” project controls and project accounting must be involved from the very beginning. There also needs to be a process in place for tracking any changes in scope, and forecasting any additional cost that may arise from scope change. In order for project controls to be effective, the project management team should have regularly scheduled update meetings (with a consistent structure) and standardized reporting formats. This will help ensure that information is clear and unaffected by varying ways of tracking and reporting cost and schedule. Certain portions of a project may be more easily managed in pieces, rather than putting it all together and trying to track and manage costs. For example, having a scaffolding coordinator to oversee the needs and costs may end up being cost-effective in the long run. In addition, for resources like cranes and pool vehicles, having a designated individual to coordinate usage can reduce overall costs and usage over the life of a project.

A major challenge to any project is the contracting of work. In an environment of scarce labour resources, lack of competition in the bidding for contracts can increase project costs. This lack of a competitive bidding environment can also mean that a parent company is not necessarily getting the best contractor for the job. Sometimes a parent company may have to settle for less than they were hoping for, which can increase costs, extend schedule and possibly increase the number of injuries on the project. Another thing for parent companies to keep in mind while setting up contracts is that reimbursable contracts provide little incentive for the contractor to get the work done in a timely and efficient manner. Owners should consider using lump sum or unit rate contracts as much as possible, to place the responsibility of cost and schedule on the contractor's shoulders. Another thing to note is that in the last five to ten years, some of the major projects

undertaken in Northern Alberta have been managed by contractors, rather than by the parent company. It was discovered that the goals of the contractor and the goals of the parent company were not always in tandem, and so aspects such as cost and schedule slipped as a result. The lesson learned is that any major project should be managed by the parent company. In the case mentioned above, once the owners were more involved with project management, schedule and productivity improved.

The third major area that can have an impact on project management is schedule. For the construction industry in general, many contractors do not have appropriate staffing levels to supply planners and schedulers to large projects. Not having these positions adequately filled from the start of a project can cause confusion about the project schedule and productivity plans. As Charles Ruigrok, Syncrude Canada Limited Chief Executive Officer, said in the July 1, 2004 issue of the National Post, *“When you’ve underestimated the number of field construction hours and you’re limited in infrastructure and the number of people you can put on the site, you [can only] push out the schedule, and at \$150 million [in capital spending] per month, it doesn’t take long for the project to escalate significantly.”* This quote supports the lesson learned that having a clear and well-defined schedule at the outset of a project can help contain costs in the long run. Schedule pressures come from all avenues of a project, including the shareholders of the company involved, the company owners, the project management team and the government.

Stretch targets can be a major contributor to project delays. Stretch targets are essentially over-ambitious goals that require breakthroughs to be achieved. In the context of a project, a stretch target might be a highly unlikely early completion date. In order to

reach that stretch target, the entire organization must continuously work above and beyond regular requirements. While stretch targets can be used successfully in some instances, in large projects they are not generally useful. When these targets are not achieved, it can be de-motivating to both the project management team and the general workforce. Some Project Managers may initially use stretch targets in order to reduce schedule pressures, but as the stretch targets are not achieved, the schedule pressures increase.

There are also external factors that can affect schedule, which the Project Manager has no control over. One is the state of the workforce in the area that the project is being undertaken. If that particular area is undergoing a labour shortage, then the Project Manager should realistically build that into their initial project schedule. If the workforce isn't available at the ideal numbers required, then the schedule will be impacted. Unless the project management team is prepared to import workers (from another area of the country, or from another country altogether) then they have to add the cost of project delays into the overall cost and schedule. Based on a Powerpoint presentation done by the Construction Owners Association of Alberta, by late 2007 to early 2008 Alberta will not have enough skilled workers in Industrial Trades to meet the needs on projected Engineering Construction projects. This shortage is expected to continue through 2008 and into early 2009. It seems as though Alberta should be able to import workers from another province, however, many other Canadian provinces are also experiencing skilled labour shortages and major construction projects as the Canadian economy flourishes. Another external factor that can affect project schedule is the availability of materials. With the significant amount of growth in the Eastern

hemisphere (especially in China and India), steel is not as readily available as it was in the past. Since many construction projects use steel (for piping, racks, supports, scaffolding, etc), this material shortage can also contribute to increasing project costs and schedule delays. Even if the workforce is complete as per the project plan, if the material is not there for them to work on then productivity and schedule suffer.

In addition to the three major components that can affect a project that can be controlled by proactive project management, there are also external factors that can negatively affect a project. One of the most significant possible external factors is that of building in an operating plant. In the cases of some of the oil refinery expansions or even the oil sands mining expansions, the construction is occurring on the plant site. With operating plants surrounding a construction site, you face various challenges. The challenges include the possibility of coming into contact with high voltage areas; long distances between the work site and the lunch/break rooms; and unplanned shutdowns that can take workers away from a project temporarily. If the project is a major construction job, site infrastructure can be limiting as well. There may be a large influx of personnel, equipment and vehicles onto the site that the regular operating facility is unable to handle. Building in an operating plant requires significant coordination between the operations managers and the project management team.

Where the workforce is concerned, union or other labour agreements can hinder a project. Some unions are quite particular about how union calls are handled, requiring that workers be hired from specific areas only. This can limit the labour pool and cause project schedule delays. Another aspect of labour that can really make a difference to the cost and schedule of a project are the chosen hours of work (for example, four ten hour

shifts a week, and then three days off). Some projects set their hours of work prior to the beginning of construction, and adhere to those hours of work fairly stringently. Sometimes the hours of work may be set by a particular trade's union hall. With the large number of projects taking place in Northern Alberta right now, workers are able to choose which projects they want to work on, and they are tending to choose projects with lots of scheduled overtime hours. For projects with set hours of work, this can cause a difficulty in attracting workers. With insufficient workforce, the project is faced with schedule delays and increasing costs. Another thing that can make it difficult to attract workforce is any project that is located in an isolated area. For a city like Fort McMurray, Alberta, which is 450km from the closest major centre, it is difficult to entice people to move there to work. In an isolated region workers may face things such as inflated cost of living, lack of after-work activities to take part in, fewer resources available, and insufficient infrastructure. Insufficient infrastructure refers to roadways, utilities, medical staff, educational facilities and services. Some cities or towns are not set up to handle the influx of construction personnel that a major project requires, and the additional people can place a significant burden on the community. Parent companies need to keep this in mind when planning a project, and try to find a way to mitigate these possible consequences. In addition to building temporary housing (often called camps), companies should consider hiring their own medical staff to care for project personnel, as well as contributing back to the community in order to support maintenance of utilities and services.

One factor that Project Managers have no control over whatsoever is weather. If a project is being built in an area that can experience extreme weather, the weather can

have an impact on project schedule. In extreme cold and heat, workers can not work outside for extended periods of time. Stormy weather can also affect work schedules, depending on the severity of the storms. Project Managers that are planning work in areas known for extreme weather conditions should build some extra padding into their schedule, to accommodate for time lost due to weather conditions. Some research into typical weather patterns for the area should provide a foundation for an estimate of how much padding to add to a schedule estimate.

Major projects can occasionally face opposition from members of the community. Whether or not a company intends it, a major project can have detrimental effects on a community. Even while the population is increasing by the number of workers coming from other areas to work (and possibly their families), there is no increase in municipal tax revenue. Those workers continue to pay taxes in whichever community they are based. Meanwhile, those people place an extra burden on the community services and utilities. These people are called the community's shadow population, meaning that they live in the community temporarily while maintaining a home base elsewhere. When this shadow population increases, a community can start to experience a housing shortage, as well as discovering that their airport and bussing facilities may be inadequate in the face of an increasing consumer base. The health care system gets challenged as well, with a significant increase in users of the system without the increase in funding. These results can combine to make a community an even less attractive place to live, which makes it difficult to get sufficient workforce to complete the project. It can end up being a vicious cycle if nobody (provincial or municipal government; parent company) intervenes on behalf of the citizens of the community.

The intent of Lessons Learned on projects is that people initiating new projects in the future don't make the same mistakes. In addition to the lessons learned that are discussed throughout this paper, there are some other suggestions that can be made to future Project Managers. These suggestions may make some of the challenges of project management a little bit less daunting, and they may help keep the project on track for cost and schedule. The first suggestion is that instead of looking for skilled labourers only within Canada, employers should extend their search around the world. India and China are two countries that are providing excellent skilled workers to other countries, including Canada. Other skilled workers are coming out of countries such as the US Gulf Coast, Australia and Ireland. If Canada's immigration laws were easier to handle for skilled workers, companies may not face as much of a labour shortage in the future as they do now. There may be complications, such as language barrier and the need for Canadian certification, but these difficulties are not insurmountable. However, before companies look outside of Canada for workers, they should maximize Albertan, and then Canadian, human resources first. Some focus should be placed on training of unskilled workers in various trades, as well as continued encouragement for women and aboriginals to enter the trades. If companies can draw from the base of workers they already have, then they can start training certain people for supervisory positions. With all of the upcoming construction projects, there is going to be great demand for Foremen and General Foremen, so companies should start the training process now. Also, companies can increase the ratio of apprentices to journeymen on the jobs, and increase their skilled labour base in that manner as well.

Provinces and territories should also consider working together to facilitate inter-provincial mobility. This would include providing upgrading and training so that workers are licensed to work in any province within Canada. Also, if there are areas of the Canada with unemployed trades, companies might be able to attract those workers to their projects, at least for the short term. When that happens, everybody benefits, including the government. When all else fails and Canada's human resources are fully tapped out, then Project Managers may need to consider bringing in Temporary Foreign workforce as a supplement to the workforce in Canada. This Temporary Foreign Workforce is not intended to replace Canadian workers, but to supplement their efforts.

The future of major construction projects around the world is bright. With increased energy consumption in nations like China and India, countries worldwide are expanding their ability to extract and refine natural resources. This means building plants and facilities to support these efforts. Some of the challenges facing Project Managers in today's environment are globally applicable, while others are site specific. In either case, spending some time reviewing Lessons Learned from past construction projects can provide valuable insight into managed project management challenges. When these Lessons Learned are paired with supporting the changes that may occur within the community, and using all human resources available as effectively as possible, Project Managers may be able to keep a closer handle on project quality, cost and schedule. That makes shareholders, company owners and contractors happy, which should make Project Managers happy as well.

Works Consulted

1. Syncrude Canada Limited. UE-1 Project: Strategic Lessons Learned, Rev. 1.1. March 7, 2006
2. <http://www.mymcmurray.com> - source for all photos used in the accompanying Powerpoint presentation. January 2007.
3. The Construction Sector Council. 2006-2010 Alberta Construction Workforce Supply/Demand Forecast. May 11, 2006.