Effects of disputes in construction

This chapter initially deals with the causes and effects of delays in projects relating to the construction, engineering and IT industries, and the resulting disputes within them. The analytic comparison of delays in each of these industries has then been carried out. Various project case studies, pertaining to the causes and effects of delays and disputes, belonging to each of the above industries have then been included to give a reader a wider scope of the subject matter. The characteristics of certain delay mitigation strategies and dispute resolution techniques have also been investigated for the duration of this chapter.

Delays in the Construction Industry

Construction industry according to George, O. (1990) ‘ may be defined as that sector of the economy which plans, designs, constructs, alters, maintains, repairs, and eventually demolishes buildings, of all kinds, civil engineering works, mechanical and electrical engineering structures and other similar works’. Delays on projects are a universal phenomenon and the construction industry is no exception. It has been regarded as a serious problem by Al-Khalil and Al-Ghafly (1999), who further state that it proves costly for both owners and contractors. According to the authors, the owner loses by missing out on the potential revenues from the use of the project and by increased overhead cost for contract administration. Meanwhile, the contractor is said to lose as a result of increased overhead costs and lost opportunities for new projects because of diminished financial capabilities.

In relation to project management, a project manager firstly needs to be concerned with the causes of delays, which could be at a national level (Kumaraswamy & Chan, 1997; Kaming et al, 1997; Mezher and Tawil, 1998;

Al-Khalil and Al-Ghafly, 1999) or at a project level (Rad, 1979; Charoenngam and Yen, 1999; Olima and K'Amumu, 1999). The next step is for them is to realise the effects of delays in terms of a project's legal disputes (Scott, 1993), cost overruns (Mansfield et al, 1994), delay analysis techniques (Bordoli and Baldwin, 1998) etc. Delay mitigation is the next step which focuses mainly on the strategies used for construction schedule comparison and accelerated working (Conlin and Rectic, 1997; Noyce and Hanna, 1998). The last step would be to analyse or examine the drawbacks of delay mitigation strategies (Cristian and Hackney, 1995) which could contribute to additional delays.

The above four steps involving delays in construction projects must be considered by project managers in order to achieve successful project completion and delivery. In a hypothetical case assuming a project is delayed because materials arrive late on site, the project manager must be able to recognise it as a delay factor. Secondly, the project manager must be responsible for calculating the effects of delays, prior to deciding upon the most suitable delay mitigation strategy. If the project manager decides to use overtime work, then this according to Horner and Talhouni (1995) will lead to a reduction in productivity of the workforce, hence a new delay factor would be added to the project.

According to Oztas (1995) the word " delay" is a relative term in construction. The way the contractor, the client, the architect and the engineer view a delay or its effect to the project most of the times, if not all, vary significantly. The differences in opinion can be explained by the role

each party plays in the contract, the cost implications a delay causes to each party, or the legal disputes which arise from the delay.

Understanding the nature of construction delays will enhance the ability of the project manager to handle them. All four dimensions must be analyzed in order to have a balanced view of the subject. The following section sheds light upon some of the causes of delays in construction projects around the world, its legal aspects and its effects.

Causes of construction delays

According to a survey conducted within the construction industry by Sambasivan, M. & Wen Soon Y. (2007), the ten most important causes of delay were found to be (1) contractor’s improper planning, (2) contractor’s poor site management, (3) inadequate contractor experience, (4) inadequate client’s finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labour supply, (8)equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.

These causes of delay were not far from what Sweis, G. et al (2008) had investigated during their survey. They claimed that the most important causes of delay were due to (1) Poor planning and scheduling of the project by the contractor, (2) Financial difficulties faced by contractor, and (3) too many change orders from owners. As far as commercial projects are concerned, the main cause of delay arises from delay in payment, since there is argument between the two parties on how financial backup will be provided.

Odeh and Battaineh (2001) carried out a survey within construction projects involving traditional contracts, in which they identified and categorised the causes of delay according to the project participants. They state that as far as clients are concerned, delay factors include owner interference, finance and payments of completed work, slow decision making and unrealistic contract duration imposed by owners.

Delay factors relating to contractors on the other hand include site management, improper planning, inadequate contractor experience, mistakes during construction, improper construction methods and delays caused by subcontractors. Consultant related delay factors include contract management, preparation and approval of drawings, quality assurance/ control, and long waiting time for approval of tests and inspections.

Apart from the above mentioned categories, the authors also mention contractual relationship issues, which include major disputes and negotiations during construction, inappropriate organisational structure linking all parties involved in the project, and lack of communication between parties. External factors contributing to project delays include weather conditions, changes in regulations, problems with neighbours and site conditions. The authors failed to mention the political and socio-economical factors, which would have been a helpful addition to this study considering delays in construction projects are not all the same.

Legal aspects

According to Carnell (2000), delay claims are perhaps the most common form of construction disputes. Scott (1993) found that more than 50% of

contracts in the UK end up with ‘ extension of time claims with supporting evidence submitted’. A similar survey by Yogeswaran et al (1999) investigated 67 civil engineering projects in Hong Kong where claims arose. These claims were a result of different factors, mainly including extension of time due to bad weather (82% of projects), variation orders (49% of projects) and delays caused by utility undertakers. However, it should be noted that claims for extra time or cost do not necessarily end in disputes in all projects.

From a legal point of view, according to Kraeim & Diekmann (1987), delays factors are classified into three main categories: (1) Compensable, (2) Excusable, and (3) Non-Excusable. According to Scott (1993), the latter terms are used in the United States, while in the UK the terms used are: (1) the client is responsible, neither party is responsible and (3) the contractor is responsible. Irrespective of the terminology used in either country, Arditi and Patel (1989) explain the above as:

Compensable/Client is responsible: Delays entitled compensable are not caused by the contractor but by the owner. The main delay factors included in this category are: owners delay in providing access to site, changes in scope of work, non payment to the contractor, improper or delayed issue of change orders, inadequate information and supervision by the owner. When a compensable delay occurs, the contractor is allowed time extension and extra costs for losses.

Non-Excusable/Contractor is responsible: Non-excusable delays are caused by the contractor’s inefficiency. The main delay factors in this category include: shortages of qualified workers, technical personnel or materials,

failure to coordinate work (i. e. deficient planning), delays caused by subcontractors, defective work that has to be redone, slow mobilisation, low contractor productivity and accidents. The owner in this case reserves the right to charge the contractor liquidated damages for such delays in the total project duration.

Excusable/Neither party is responsible: Delays in this category are caused by events that are beyond the contractor or the client's control. Factors include extreme weather conditions, fire, flood, strikes, and lockouts; vandalism, war, epidemics, damages caused by parties others than the contractor or the owner, government actions or construction law. According to Kraeim and Diekmann (1987), excusable delays are listed in a clause in the contract document (i. e. Force Majeure Clause) and that the sole relief for excusable delays is time extension.

The authors argue that the situation becomes more complicated in the case of concurrent delays. ' These types of delays occur when the overall delay is caused by several factors, some of which are within the owners responsibility and some of which are within the contractor's responsibility' (Arditi and Patel, 1989; pp. 146).

The effects of delays

To investigate the effects of delays in large construction projects, Assaf & Al-Hejji (2006) conducted a survey in which it was concluded that 70% of the projects experienced time overruns. Their research showed that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun was between 10% and 30%.

A similar observation was made by Aibinu & Jagboro (2002), whose findings for the Nigerian construction industry showed that time and cost overruns were frequent effects of delays. They had stated in their research that “ delay had significant effect on completion cost and time of 61 building projects being studied.” In a similar but a more integrated approach to finding the effects of delays in construction projects, Sambasivan & Wen Soon (2007) identified six effects of delays to be (1) time overrun, (2) cost overrun, (3) disputes, (4) arbitration, (5) litigation, and (6) total abandonment of the project.

A delay affects both the construction schedule and the cost of a project. The impact on the construction schedule depends mainly on the activities in which the delay is encountered and the existence or not of float in the delayed activities. The cost effects are mainly related with the types of costs associated with the delayed activity, e. g. the liquidated damages for delay. In order to make a general statement, the author believes that the time value of money should be taken into account. The most likely effect of delay is the reduction of the NPV of the investment. Furthermore, as Thomson (1995a) state, since most recourse costs in construction projects are time related, consequently any extension of programme will lead to increased costs. An analysis of the two main effects follows.

Impact on the construction schedule

Bordoli and Baldwin (1998) classified delay factors in six types according to their impact on the construction schedule. These types are:

- Date delays: an activity cannot start or finish until a specific date irrespective of when preceding activities were carried out or were planned to be carried out. For example, a delay of this type occurs when the delivery of plant or materials is scheduled for a specific date without which the work cannot start.
- Total delays: Complete stoppage to all parts of the works occurs. For example, strikes and lockouts or postponements of the works.
- Extended delays: Duration of an activity is extended. For example when an increase in the work content of an activity occurs.
- Additional delays: New construction activities are added to the planned work. New or additional work is incorporated into the project, subsequent to the production of the original programme.
- Sequence delays: Activities cannot start or finish in the sequence originally planned. For example, changes in specification of materials or techniques which result in activities no longer able to be carried out concurrently.
- Progress delays: when the progress of the works was less than that planned. This could be the result of the use of inadequate labour, plant or materials, or even excessively ambitious time estimates.

Examining the latter types of delays gives an overview of the impact delays on the construction schedule. The effect of a delay on the schedule can range from few minutes, hours, days to complete stoppage of works. The schedule is altered in many ways. Activities must be re-planned, changes to the sequence of work can occur, logical linkages between activities could change and resources have to be reallocated. As far as the duration of work

is concerned the main factor that must be considered is float. When a delay occurs in critical activities it is clear that the duration of the project will increase if the contractor doesn’t accelerate works. When a delay occurs in non critical activities then what is important to consider is the ratio between the float and the duration of the delay. If the float is consumed then this will, in turn, change the critical path of the project by concerting a non critical activity to a critical one. If on the other hand, the delay is less than the float then the overall duration of the project is not affected but the risk of overrun is increased, by the increased probability of further critical delays.

Cost overruns

There are several scenarios related with the cost overruns of construction delays. Oztas (1995) mentions that delays lead to additional expenses incurred by the contractor and that most of them occur due to prolonging the job, reallocation of work forces, storing extra materials on site, wasting materials, or loss of productivity or workers due to reassignment.

It is vital for the project manager to assess the cost overruns in terms of materials, equipment and labour costs. There are several types of costs associated with any delayed activity in a project. Thompson (1995a) identify these as being (1) fixed charges incurred at any point in time, (2) quantity proportional charges related to quality of work completed, output of deliveries of materials, and (3) time related charges which, according to the author, refers to the cost of resources. The author argues that the sensitivity of delay in terms of cost will be determined by the relative contribution of each type of cost mentioned above, and the existence of float. Delays occurring on a critical activity lead to an extension of the duration of the

project in most cases, which, in turn lead to an increase in both fixed and time related costs.

Another major concern for a project manager in terms of construction costs are liquidated damages. Scott (1993) explains liquidated damages as being a sum of money, usually specified in the contract, being deducted from the contractor in the event of a failure to complete the project in the specified time frame. They state that the contract normally specifies a predetermined time after which it must be substantially completed and available for use. An example of a standard form of contract including a clause of liquidated damages includes the ICE Condition of Contract Edition 7, Clause 47 (Hawker, 1999).

Delays as a benchmark of success

Construction delays are not necessarily a root cause of failure of a project. Many authors investigating the causes of success or failure of projects agree that the classical triangle of cost, time and quality should not be used as the only measure of success of projects (Morris and Hough, 1987; Gardiner and Stewart, 2000; Atkinson, 1999). The latter argument is based on the fact that most construction projects encounter both time and cost overruns. Rad (1979) estimated that the increase in terms of time and cost of nuclear plant projects in the United States was significant. Similarly Morris and Hough (1987) who evaluated the records of more than 4000 projects between 1959 and 1986 concluded that the success rate of projects is generally poor and that overrun values range between 40 to 200 percent. Perhaps the most extreme view concerning time and cost estimates of projects is expressed by Atkinson (1999) who states: ‘ Time and cost are at best only best guesses,

calculated at a time when least is known about the project’. The overall conclusion drawn from current research is that construction delays and cost overrun is not something rare but instead a common phenomenon.

Since time and cost may not be the best measures of success, alternatives must be presented. Gardiner and Stewart (2000) state, that the Net Present Value of the investment should be used as a criterion of success. They concluded that: ‘ It is recommended changing the performance measures that are common today from: The project was delivered on time, to budget, and of the required quality to: The project was delivered with the best achievable NPV and to the required quality’ (Gardiner and Stewart, 2000, pp. 255)

Atkinson (1999) considered a new framework to consider success; The Square Root. The main idea behind this new framework is that the there are four categories of success criteria. The first is the classical time-cost-quality triangle. The second is concerned with the maintainability and reliability of the information system. The third is related with the benefits for the organization in terms of improved efficiency, effectiveness and profits. The last group of success factors such as satisfied users, social and environmental uses and personal development.

Examining the discussion related with project critical success factors brings into light different aspects of construction delays. If, on one hand, the primary objective of a project is to finish on time then a delay during construction could be the main cause of failure of the project. On the other hand, if the primary objective is customer satisfaction then a delay may just

be the effect of design changes, which will lead to the desired customer satisfaction and project success. In all cases the primary objectives of the project will determine the role of delays to the success or failure of the project.

Delays in the Engineering Industry

The engineering industry is one of the most important basic industries for any economy. It has been referred to by Desai (1987) as being an economy's ' Engine of Growth'. It supplies plant and machinery for other industries, equipments to build up infrastructures, automobiles, aircrafts, and a host of other tools and equipments. The engineering industry has widened its base across a broad spectrum and inducted the latest technology in many areas including, electrical and electronics, mechanical, transportation, industrial and other miscellaneous engineering sectors.

According to Mahapatra and Biswal (2007), the development of an economy and the achievement of self-sufficiency in various sectors depend to a very large extent on the development of the engineering industry. Since it being such a large industry, it is also not immune from delays. The project participants in engineering projects are known to be consultant engineers, contractors and owners. Similar impacts are observed on project participants in this industry due to delays, as are mentioned above for the construction industry. The following section looks into some of the causes and effects of delays in the engineering industry.

Causes of engineering delays

Yates (2007) identified a list of common delay factors belonging to both the planning and operating stages of engineering projects. They are (1) Political and Social unrest, (2) Religious and Social factors, (3) Labour disputes and strikes, (4) Technologic and Economic limitations, (5) Government Restrictions, (6) Global technical delay factors (7) Changes in project requirements, (8) Lack of communication between various divisions, and (9) Miscellaneous planning delays . The author explains the above delay factors as:

Political and Social unrest: Certain regions of the world are said to be undergoing drastic and violent changes in their political, economic and social environment. Situations like these limits access to foreign contractors working in large engineering projects, and hence are a cause of major delay in project execution. The author argues that the ruling party in such countries are afraid to make political decisions on social or economic reforms for the fear of jeopardising the delicate balance existing between various ethnic groups, political parties and social classes.

Religious and Social factors: With the aid of engineering projects being executed in the Middle East, the author argues that foreign contractors often tolerate delays due to religious festivities in these parts of the world, e. g. during the month of Ramadan. It is in these times that local labourers are hard to hire as they are not readily available due to social and economic reasons as stated by the author. As a result engineering and construction firms often import foreign labours into these parts of the world, by which they experience both time and cost overruns.

- Labour disputes and strikes: Labour disputes or strikes are said to be a common delay factor in engineering industries and tends to disrupt construction or manufacturing schedule. Project managers need to identify and effectively negotiate with the labour representatives in order to stop further delays emanating from such undesirable events.
- Technologic and Economic limitations: These include factors such as design standards, constructability issues, performance standards, quality standards, material availability, testing, inspection and safety. On the other hand, economic limitations include factors such as inflation, escalation and the availability of cash flow. Furthermore, the level of motivation in the workforce also plays a useful role in limiting economic delays. The importance of motivation in employees has been discussed earlier in Chapter 2.
- Government restrictions: These include imposition of legal restrictions, regulations and interference by the local government, which tends to disrupt the manufacturing and construction in an engineering industry. Some governments such as Japan put on restrictions such as acts of protectionism, where foreign firms are not allowed to operate in their country. Other government restrictions include the requirement and inspection of certain permits, before during and at the conclusion of the end product.
- Global technical delay factors: The results which the author has been able to gather from a global survey of engineering projects indicated the following causes of technical delays: (1) Design modifications, (2) Weather (climate), (3) Material delivery, (4) Equipment delivery, (5) Incomplete drawings, and (6) Material quality.

- Changes in project requirements: This has been termed by the author as ‘ one of the most frequent causes of planning delays’. Irrespective of where a project is going to be built, project owners are often indecisive in their approach during the planning stage of an engineering project. The need for project owners to prioritize projects is a critical step towards attaining timely project completion.
- Lack of communication between various divisions: Ineffective communication in an organisation that is planning and designing projects often leads to multiple delays. A project manager who knows how to effectively document processes helps to reduce delays along with steps like formalising the planning process, scheduling routine team meetings, assigning the project to an experienced project manager, or empowering the project manager to act as a conduit for communication. The need of having effective communication in organisations has been discussed previously in Chapter 2.
- Miscellaneous planning delays: Other factors that cause global project planning delays include the following: (1) Lack of political and governmental support, (2) Hidden agendas and strong individuals pushing their ideas, and (3) Lack of knowledge about planning processes and strategic planning.

Legal aspects

Certain contractual claims exist in the engineering industry. An example according to Smith et al (1999) includes a claim made under clause 12 of the ICE contract, which entitles contractors, in limited circumstances, to claim in respect of delay and extra cost should they encounter certain adverse

physical conditions or artificial obstructions as the work progresses. In such claims there is no blame on the part of the employer or the engineer since adverse physical conditions are a neutral event, and the issue of suspending the works is merely the exercise of a contractual right. Apart from contractual claims, there are certain claims for breach of contract, for example clause 7(4) of the ICE conditions contract entitles contractors to claim for delay in issuing drawings or instructions by the engineer at the right time. According to the authors, the engineer’s failure to provide information at the right time is a breach of the express provisions of the contract, for which the employer is held accountable in law.