RISK AND IMPACT MANAGEMENT IN SUBMARINE CABLE PROJECTS

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Abstract: The implementation of any submarine cable project faces challenges due to various types of risk. Risks arise due to the nature of the project, namely the physical laying of thousands of kilometres of cable, connecting multiple points on the globe.
Risk management is one of the most important factors in implementing a submarine cable. To successfully implement the cable, it is important to take in account knowledge of project risks in the initial project planning to avoid foreseeable project impacts. On the other hand, the cooperation of the Purchasers and suppliers is essential to quickly mitigate any emerging risk and/or solve the problem.
This paper focuses on the risks induced by 3rd parties including stakeholders, in terms of risk types and risk impacts, and gives hints for their treatment and pre- and post-actions.

1. GENERAL

Quick and on-time delivery of a submarine cable system is essential to everybody concerned with the project. The supplier is always working with great effort to deliver the project on time, providing new ideas to control project implementation in an environment unique to each project. It is beyond doubt that great successful achievement is accomplished when all the project members are looking in the same direction to generate the project's driving force. Because both the suppliers and Purchasers are in the same boat once the project has started, the cooperation of both parties is key to success. This applies in particular to the project managers from both sides, who build the project teams, share implementation issues, provide ideas to resolve them and take the necessary action, for the best project management scheme and the best results.

As is widely known, most submarine cable supply contracts are delivered on a turnkey basis. Once the project is started, activities typically comprise system design, desktop study, marine route survey, equipment manufacturing, factory acceptance, marine installation and system commissioning testing, followed by Provisional Acceptance. The delivery of a submarine cable system is wholly different from the delivery of a factory product. This is because of the various stakeholders and physical field conditions surrounding the project. Especially, submarine projects have one of the widest geographical spreads because the cable physically connects landing points which are most likely international. One of the biggest characteristics is that the working site is in the deep sea, where no human can directly reach. Even in such a difficult place to reach, certainly we have stakeholders there.

It is natural that the implementation of a submarine project is easily impacted by external factors because of the huge physical extent of the installation. In project implementation, such external factors are recognized as project risks. In order to manage such risks, the project must be carefully planned, taking into account risk analysis and study results. In fact, prediction of those risks based on study and analysis, and the cooperation of the Purchasers and suppliers to solve problems are essential to achieve successful project implementation.

2. PROJECT PLANNING

Project planning is the process to compose all activities related to the project scope in order to smoothly manage the project. Project planning is also important in visualizing each project element. By doing this, project activities and the relationships among these elements are easily visible to the project members, and the project manager can ensure that all project resources fit the schedule. The project plan is broken down into detailed tasks, detailed schedules, action plans, organizational structure, plan of work and risk analysis. During the implementation stage, project monitoring must take place to identify and resolve risks.

Submarine cable projects are one of the most difficult projects to implement in terms of risk management and control. The difficulty mainly comes from the turnkey basis of the contract, in which design, manufacturing and implementation are consolidated in a single package.

The design of a submarine system has various aspects, such as the overall system, equipment, marine route and installation. Here we discuss the marine route and installation design. The project begins with a desktop study (from time to time, the desktop study is the Purchasers' scope of work even though the project contract is on a turnkey basis), followed by pre-survey route determination, survey permitting, marine route survey, and route engineering. These activities culminate in the determination of final cable route. Even for these processes in the first half of the project, we have challenges to acquire survey permits from various stakeholders in timely manner, taking into account weather conditions in the survey area as inshore and offshore marine operations are largely controlled by weather and sea states. Unfavourable sea conditions would reduce the survey data quality and have implication on weather standby for vessel safety. All these things must be managed in an efficient way as a part of the contract scope of work. In the final stages of marine operations, cable load and laying (marine installation) will take place, however again permits are required from widely-distributed international stakeholders.

In recent years, the relationships between projects and stakeholders are getting more and more important in implementing submarine cable systems. As typical examples, key factors are the rights of way and/or permits related to national security, natural resource management, environmental management, cabotage law to prioritize domestic vessels, and so on. The deal is also getting more and more difficult as these factors are considered to be increasingly important to the stakeholders. This trend seems set to continue.

Stakeholders are not only countries or governments but also private entities such as oil/gas field concession operators, and fishery unions. Fishery compensation negotiated by unions shall be settled by the cable owners because the cable will occupy the seabed until the end of its 25 year design life. Fishery compensation costs are rising compared to the past. Unfortunately, there are even cases where compensation is made when some fishermen (believed to be illegal ones) fish on the cable and sometimes damage it. Also, cable owners could not comprehensively compensate all fishermen which operate on the cable route. Some cable owners contact fishermen and provide educational activities to fishermen, to instil a culture to protect submarine cables.

On the other hand, there has been an unavoidable risk throughout the history of cable laying job since the 19th century. That is the "nature of the planet" – weather. As an example from our companies' frequent working region, we encounter bad weather in winter in the north Pacific, monsoon season in the southeast China Sea, also monsoon season in summer time in the Indian Ocean. The southern tip of Africa near Cape Point and the southern end of South America are expected to experience bad weather most of the time.

Project planning must take into account all of these factors otherwise project implementation will suffer greatly.

3. INFLUENCE ON PROJECT PLANNING BY EXTERNAL FACTORS.

The project schedule is carefully composed in consideration of the external factors and related risks discussed above. The schedule may be planned by the supplier, or may be planned jointly between the supplier and customer. In either case, it is important to take into account all possible risks, and to track these risks throughout implementation. The project manager must identify the risks, evaluate their impact and resolve them.

In planning the project, we can take into account the risks as much as possible in order to make the project controllable.

However, it is mostly the case that the project implementation period is governed by unavoidable external factors. The most common ones are stakeholder matters such as permits, fishermen, etc., and natural phenomena such as weather.

External factors will typically result in the project period being 20% to 100% longer than the 'no-risk-considered' plan of work. Most of the time, the activities influenced by such factors are on the critical path of the project.

Weather risk involves no human factors so planning for this can be more easily taken into account compared with other risks.

As may be understood, a fixed project period regardless of the project start date (contract into force date) will not work because of weather risks. Everywhere there are favourable seasons for marine installation, and following such season will result in smoother implementation.

The cable project's business plan must also take into account this point. Making a business plan based upon unrealistic conditions will never be practical.

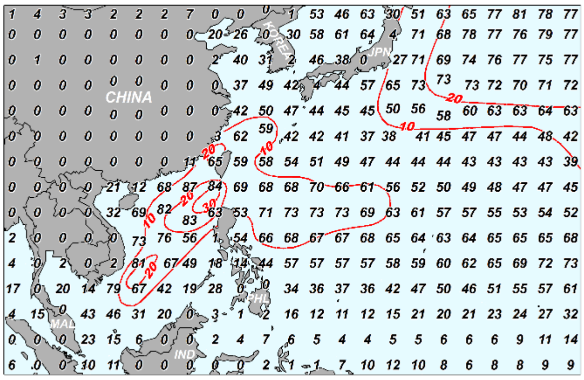
4. INFLUENCE OF RISK FACTORS AND COUNTERMEASURES

1. Weather Risks

Periods of bad weather, such as winter time and/or monsoon season shall as far as possible be avoided during the selection of the marine activity window. Activities which are severely influenced by weather are: cable landing; cable burial; ROV work, and cable jointing. These activities are intended to be carried out under calm weather conditions, therefore resources including vessels will be forced to stand by under bad weather, which directly leads to project delay day by day or release the resource to take more time to resume. If the resource is also assigned to other parts of same project, the delay would be accumulated. Surface lay is still feasible in bad weather condition subject to performance of the vessel, however activities under bad weather sometimes influence the safety, i.e. it exposes the working vessel itself to risk. For example, if the main lay vessel decides to evacuate from the site, it may easily take more than one week to resume the work because of the cable cut, evacuation, return to site, recovery of the cable, and jointing. In case project schedule recovery is required, and if it can be achieved only by deploying additional resources (such as an installation vessel), the order of cost will be in the millions of dollars.

Typical examples of weather charts for the Southeast China Sea, Indian Ocean and North Pacific in bad weather season are explained below.

- Southeast China Sea

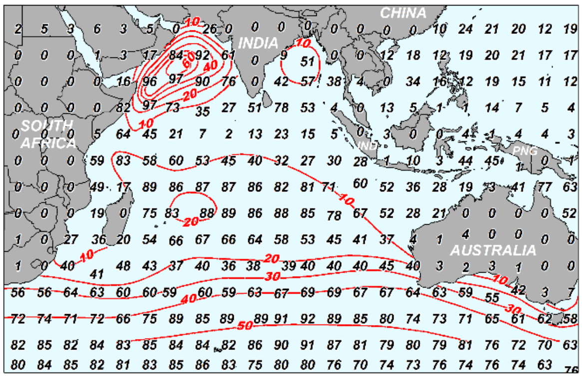


Exceedance values (%) of Wind Force 5 (8.0m/sec) and Frequency(%) of Wave Heights (3.7m) in December

Figure 1: Southeast China Sea in December

The Southeast China Sea is characterized by the seasonal monsoons. Northeast monsoon prevails over most of the area in winter and southwest monsoon predominates in summer. The frequency of force 5 winds or more is the highest in December with 70% to 80% in the Northern South China Sea and 20% to 45% in the Southern South China Sea. A large portion of the South China Sea observe ≥ 3.7m waves 10% or more of the time, the frequencies increase to 30% northeast of the Philippines. Tropical cyclones are active between April and December with the peak season during July and August.

- Indian Ocean

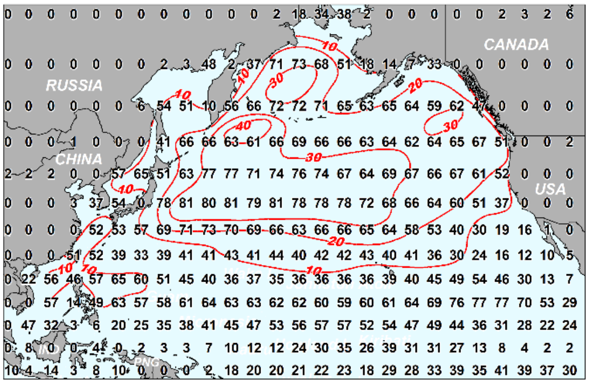


Exceedance values (%) of Wind Force 5 (8.0m/sec) and Frequency(%) of Wave Heights (3.7m) in July

Figure 2: Indian Ocean in July

The Indian Ocean is affected by the seasonal monsoons. The southwest monsoon produces the strongest winds during July. Average force 2 to 4 over the Bay of Bengal and force 4 to 7 over the Arabian Sea. Gales are recorded in the Arabian Sea (north eastern Somalia to 20°N) and the Roaring Forties (cantered near 43°S, 62°E). The strong winds in July produce the highest frequency of wave heights ≥ 3.7m; in particular in the Bay of Bengal (60%) and north of 50°S (50%). Tropical storms are most common during the inter-monsoon transitions, from May to June and from October to November.

- North Pacific Ocean

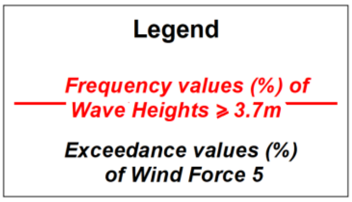


Exceedance values (%) of Wind Force 5 (8.0m/sec) and Frequency(%) of Wave Heights (3.7m) in January

Figure 3: North Pacific Ocean in January

The winds in the Pacific Ocean are controlled by the high and low pressure systems and their associated fronts. Strong winds and gales can blow from any direction during winter with the worst month in January. Force 5 winds or more are observed for 50% to 80% of the time. Wave heights ≥ 3.7m are fairly common in the entire North Pacific in January with frequencies of 20% to 30%. Hurricanes are most likely to be encountered in the area between 10°N and 30°N from late May to early November, with the peak between July and September.

Legend for Figure 3 is as follows:



2. Fishing Activities and Anchoring

Fishermen are one of the largest stakeholders' groups sharing the ocean.

There are a variety of forms of relationships between cable owners and local fishermen, and a variety of fishing styles and methods. A particularly hazardous fishing activity is trawl fishing; deploying nets on the sea bed. This takes place in shallower water where the cable is generally buried. Long line fishing is sometimes hazardous during installation because the cable being laid between the vessel and the seabed may be damaged.

For both fishing activities and anchoring, one of the biggest problems is illegal activity. Illegal fishing and anchoring are quite unreasonable. Figure4 shows evidence of illegal fishing. Sometimes they cannot be avoided however it may be possible to find a hazardous vessel using AIS (Automatic Identification System), and it may be possible to track the vessel if it is suspected to have damaged the cable, and to finally make a claim.

Making good relations and dealings with fishermen is very important not only in the installation phase but also in the operation and maintenance phase. In both phases, activities are advised to familiarize fishermen with submarine cable systems, by regular meetings or other means of publicity.

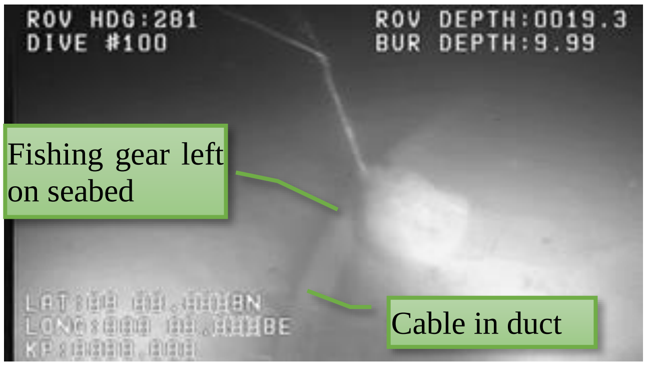


Figure 4: Damaged cable by illegal fishing

3. Permits/Rights of Way/Wayleaves

All these terms can be interpreted as a "Cable Laying Permit" for the cable to occupy the seabed. According to United Nations Convention on the Law of the Sea (UNCLOS) which came into effect in November 1994, such permits are not applicable in the EEZ (Exclusive Economic Zone) and the High Seas. However, there are some countries which require permits even in the EEZ. The conditions to acquire permits are sometimes becoming more complicated, and the time to acquire them increasing. This is one of the most considerable points in project planning, including the possible impact on the project and contingency planning. The cable route is sometimes required to change course because of national security or other reasons.

Other stakeholders related to wayleaves are OCB (Oil Concession Block) operators. They have their own plans to operate in certain areas on the seabed. Generally these plans are not opened, therefore detailed discussion is required with OCB operators before the cable route can be finalised.

4. Cost and Time Impact

Discussed external factors are plotted in Figure 5. The horizontal axis shows time impact and the vertical axis is the cost to solve the issue. Please note the figure is in Logarithmic scale.

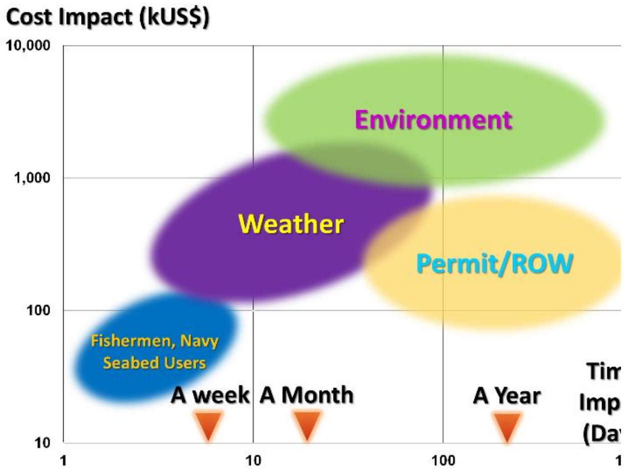


Figure 5: Plot of external factors

Environmental issue sometimes takes long tie to solve and costly. Weather and permission factors are the major ones, therefore these factors must be taken into account during initial project planning.
The items at the lower side of the vertical axis are easier to manage because they can be solved at a reasonable cost. By contrast, the higher part of vertical axis requires much higher cost, therefore these items shall be considered in the initial planning.

5. CONCLUSION

It is essential to keep to the initial project schedule to smoothly complete the project implementation. Friction in the project results in planning changes, which always militate to delay the project implementation. Therefore, the risks discussed in this paper should be taken into account from the initial project planning stage, having sufficient consensus among the Purchasers and suppliers. It is much better if countermeasures against potential 3rd party risks are agreed at the beginning. Furthermore, communication and co-operation among Purchasers and suppliers is the key.
Of course, 3rd party and weather factors are not the only issues to be considered in project planning and implementation. As is widely understood, a submarine project follows a general sequence of survey, cable manufacturing, cable laying and commissioning, in synchronization with TSE manufacturing and in-station activities. Good understanding and sharing of information related to these activities, and cooperation between project members is also very important. If all project members understand these issues, then if some risk were to appear, project members would easily understand the nature of the problem and it would be quicker to solve. Concerning stakeholders, it is preferable not simply to wait for their reaction to the project, but to propose a solution to move implementation forward.

In the end, cooperation, consensus and mutual understanding among Purchasers and suppliers are essential to smooth project implementation. This is a universal truth.

6. REFERENCES

[1] Wave height information: Pilot Charts published by the Defense Mapping Agency, United States of America
[2] Wind Speed information: Atlas, R., R. N. Hoffman, J. Ardizzone, S. M. Leidner, J. C. Jusem, D. K. Smith, D. Gombos, 2011: A cross-calibrated, multiplatform ocean surface wind velocity product for meteorological and oceanographic applications. Bull. Amer. Meteor. Soc., 92, 157-174. doi: 10.1175/2010BAMS2946.1 (Atlas SSM/I level 3.0 datasets, SSM/I Derived Global Ocean Surface Wind Components covering the years from 1995 to 2004)

