TRANSPORT SOLUTIONS FOR TOMORROW

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ABSTRACT: A transport solution that meet the needs of the current generation and that can also meet the needs of future generations is one of the goals of the MTR Corporation. To that end the Corporation has developed a Sustainability Competitive Advantage model that combines stakeholder engagement with risk management through a dynamic relationship. This paper presents some background to the development of the model, details the model and shows how it is being used for the design and construction of the West Island Line on Hong Kong Island. Further considerations are given to how carbon assessments may impact future projects.

1. INTRODUCTION

The MTR Corporation in Hong Kong is currently in its most ambitious railway expansion programme in its history. In the next 5 years, the Corporation will build and commence operations on 88 kms of new railway including a 26km long connection to the high-speed Chinese Railway system. Safe, efficient and environmentally friendly operations of the final product must be fully appreciated through the design and construction of these transport solutions.

Railway design can no longer only reflect the views of the operator and maintainer. A successful rail line must nurture the local communities in which it operates and take into account local wishes to the maximum practical extent. There will undoubtedly be concerns raised from the local community regarding short term construction impacts and longer term impacts regarding vent shafts for underground rail lines, locations of entrances the location of nearby passenger transport facilities etc. It is incumbent on the operator / maintainer to develop an ongoing relationship with the local communities to maximize the benefit of this very long lasting infrastructure.

Transport solutions planned today must meet the expectations of the customers when revenue service commences as well as being able to satisfy the needs of future generations of users. While this is a difficult task, the MTR Corporation in Hong Kong has been implementing a Sustainability Competitive Advantage (SCA) model as a meta process to assist in meeting these challenges. This paper will share our current achievements, in particular the development of stakeholder engagement and use of risk management for environmental assessment.

Section 2 will provide a background to previous stakeholder engagement activities for the Ngong Ping 360 Cable Car Project and the West Island Line. Section 3 will outline MTR's Sustainable Competitive Advantage Model and Section 4 will provide further insights in assessing engagement. Section 5 will present EIA issues in terms of a risk management approach where Section 6 will examine current activities in assessing carbon emission as a new potential risk area. Conclusions will follow in Section 7.

2. BACKGROUND

2.1 Cable Car Sustainability Advisory Committee (SAB)

In connection with the construction of the Ngong Ping 360 Cable Car on Lantau, the MTR Corporation established an independent advisory group, the SAB. Lead by Professor Richard Welford Hong Kong University, the SAB consisted of 16 members representing Hong Kong's Green Groups, the local community and businesses, the local educational community, relevant Government Departments, the contractor and the MTR.

The SAB developed its own set of indicators specific to this project and over a two-year period assessed the achievement of the works. The results have been presented elsewhere, MTR (2003), and a copy of the SAB Final Report is available through MTR.

The SAB was viewed as a successful model for stakeholder engagement and management at that time and many of the premises and skills involved in this project have been taken to heart in our current stakeholder engagement process.

2.2 West Island Line (WIL)

From the outset MTR viewed the WIL as a people, society and urban living impact transport scheme, requiring a more complex and creative approach to project strategy. WIL is being constructed in a densely populated community, restrictive built environment and in an atmosphere of distrust of new town planning infrastructures. By adopting this people/ society impact view and taking process ownership, creative initiatives have been formulated to mitigate risks and distrust while capitalising on opportunities presented. This positioning adds to MTR's broader project strategy the further social / political dimension to rail network design considerations, and the knowledge that the community is an influential voice in the process for designing and planning projects.

In strategising community ownership of the WIL, MTR implemented a leveraged form of partnering to engage principal stakeholders at the very early stages of the project. In carefully planned public forums and meetings the community expressed their expectations on the project, prompting a review of the key features of the project at different stages of the design development. The objective was to assess the efficacy of our own best design efforts and seek improvement without adding further costs. By such involvement at the more flexible stages of project planning, the Corporation has captured a series of important benefits that have led to both substantial and creative change in project design and the wholesale community buy-in. Among them is the preservation of the unique tree-wall structure adjacent to the planned Kennedy Town Station.

Now in construction the engagement is regularly reviewed and prioritised stakeholder feedback is incorporated to improve constructively social and urban impacts where sensible and feasible within the project. This strategy serves in parallel as a powerful conduit of information to the Government of the benefits of the new line as well as a medium for communication between the Government and community interests. This process, by default, has established the model for soliciting expectations in future community buy-ins for other rail lines now in various proposal stages, which MTR is applying to all further rail lines.

Our goal in this process is to achieve a popular and anticipated railway extension, the best and most effective design for users, and a tolerance of future community disruption in the construction stages and a sense of community participation.

Further information on WIL can be found on the Corporation's website.

3. MTR's SUSTAINBLE COMPETITIVE ADVNATAGE (SCA) MODEL

Stakeholder engagement and its related management processes taken to an extreme would have deleterious impacts on any project. The challenge is to develop a process that can balance the priority input from the stakeholders in relation to the risks faced by the design, construction and operation of the rail line.

Through its sustainability practices, MTR introduced a model for Sustainable Competitive Advantage in 2004. The model is shown in Figure 1 to consist of two interlocking loops; on the left the process of risk management and on the right the process of stakeholder engagement. Also shown in this figure are the various steps involved in the two processes loops. For risk management: Identification and prioritisation, Actions to mitigate risks and Monitoring and Reporting. For stakeholder engagement: Stakeholder Expectations, Gaps between the stakeholders' and the Corporation's expectations and finally Actions to be taken by the Corporation to reduce or eliminate the Gap. The two process loops are connected through the MTR's unique Vision, Mission and Values, more information of which is also available on the MTR website.

Throughout the years the Corporation has tested this model under a number of scenarios and concluded the processes and implementation are applicable to major infrastructure projects as well as organisational and business development.

Some important points are directly relevant in applying the sustainability model to infrastructure projects.

- A robust process is needed to identify and prioritize stakeholders. Not all stakeholders are important and not all stakeholders are relevant to all issues all of the time. Additionally, new stakeholders may arise during the project necessitating a more frequent review of the engagement process.

- Actions accruing from the full set of stakeholders may differ considerably and communications material and programmes have to be adjusted to speak to the concerns of certain stakeholder groups, and at their level of understanding.

- Sufficient training of the project team dealing with stakeholder issues is an imperative as is more senior overview for a strategic perspective and conflict resolution.

- Relying exclusively on the Technical Memorandum (TM) under the Environmental Impact Assessment Ordinance (EIAO) to identify and prioritize environmental risks is insufficient. Confirmation of the importance of local resources is needed and is best undertaken by those directly effected, the local community.

- Even though environmental impacts from infrastructure projects may be mitigated to acceptable levels in regard to the Technical Memorandum criteria and other relevant Ordinances and Government Circular, the impacts themselves may not be socially acceptable or mitigated in a simple fashion.

4. STAKEHOLDER ENGAGEMENT

Following the SCA Model outlined above, an assessment of relevant stakeholders indicating their relevant importance versus their ability to impact the position of the company or project can be undertaken in a straightforward fashion and concluded in a stakeholder management plan. However, further assessment is needed to add robustness and a sense of timeliness to these conclusions.

Winter and Steger (1998) have developed a methodology to consider the position of the project proponent relative to the nearby residents on an emotive basis. The application of this to a railway project was developed previously for WIL, Frommer (2003). The methodology summarizes the proponent's position in terms of the following

- Whether the objector has an aim or clear goal,
- Whether the objector can obtain public understanding or sympathy,
- Whether the objection is symbolic,
- Whether the proponent's image can be damaged
- Whether there is a strong opponent,
- Whether the public can get involved,
- Whether the issue(s) is confrontational; and
- Whether there are dramatic elements involved.

The summary stakeholder assessment for the WIL project is presented as Table 1. Given the dense urban setting for WIL it is not surprising that the proponent is in a highly disadvantaged situation. The residents have every reason to complain and could see substantial support from the local politicians. As a result, all assessment criteria are considered favourable for the residents, but unfavourable for the proponent. In fact, public opinion might just swing to the extent that the project would not go ahead. The local residents could also exploit the environmental impacts to either delay this project or gain financial advantages. As noted above in Section 2, the Corporation has been somewhat successful to date in resolving many of issues involved with the WIL project.

5. RISK MANAGEMENT AND EIA ISSUES

In accordance with the Environmental Impact Assessment (EIA) Study Brief, an EIA aims to provide information on the nature and extent of environmental impacts arising from the construction and operation of a Designated Project (DP) under the EIA Ordinance. The information presented in the EIA will allow the Director or Environmental Protection Department to consider the following.

- the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the DP;
- the conditions and requirements for the detailed design, construction and operation of the DP to mitigate against the adverse environmental consequences where practicable; and
- the acceptability of residual impacts after the proposed mitigation measures are implemented.
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It is an underlying assumption to the above that the criteria of acceptability refer to those issues detailed in the EIAO TM. The TM was issued in 1998 and has not been updated since. It should also be noted that the Advisory Council on the Environment (ACE), which plays a

critical role in the review of EIA documents, can recommend further mitigation and can even withhold endorsement of an EIA. This can have significant programme and cost impacts to a project.
With this in mind the SCA Model can be used to provide additional guidance in developing a risk based approach to environmental issues. Further details can be found in Frommer (2003).
Risk Management is a cyclical process, by which risks are identified and prioritized, actions taken to control the risk and the results are monitored and reported (Carter et. al. 1994). The process of risk management generally includes the following stages.

- Risk identification and documentation
- Risk classification and quantification (prioritization)
- Risk modelling or analysis
- Risk reporting and strategy development
- Risk elimination, mitigation and/or optimisation (opportunities)
- Risk monitoring, incidence control and reporting.

Each time the process is initiated, potential risks are reviewed or recognized, and the process repeated. An additional review frequency increases the possibility that the process being considered can progress to the best possible conclusion, addressing risks that may have changed in significance by identifying new risks.

The level of detail involved in identifying and assessing risks can be substantial. It is a general rule that one can obtain the most insight into the risk process by using a simple approach with simple spreadsheets and graphics. Of course very detailed models using advanced computer simulations can be used but these are costly and time consuming. They may not yield intuitive results and are generally not found to be necessary for environmental assessments.

Identification of risks can rely on those noted in the EIAO TM. The Corporation considers a basic quantification of environmental consequence by considering the product of two separate parameters: frequency of impact and the significance of the impact.

Frequency is viewed as how often the impact occurs and the probability must account for how often the impact will occur and consider both the unmitigated and mitigated cases. A known assessment methodology and tried and acceptable mitigation would result in a lower probability while an unknown methodology and untested mitigation would result in a higher value. The product of frequency and probability will result in a measure of consequence. A level of acceptable consequence can be set for any project, which will impact cost and programme.

A simple numerical consideration of the parameters is as follows.

Frequency of Impact: Low = 1, Medium =3 and High = 5
Probability of impact: Low = 1, Medium = 3 and High = 5,

An assessment of the identified risks for the WIL Project is included for reference as Table 2 and Figure 2.

Using this map it is possible to management the environmental issues appropriately.

- Consideration can be given to the skill set for the EIA Manager of the particular project.

In this case, it would be best to have a manger that is savvy on noise issues and one that communicates well with the public, site staff and management. An expert in ecological issues might not be the best choice;
- Consideration can be given to the extent of technical as opposed to management input that will be needed to control the risks pertaining to each issue shown in Figure 2. More management input is expected in noise and stakeholder management;
- Figure 2 could be used to outline the skill set of a consultant to undertake the EIA. In this case a consultant with expertise in noise would be preferred as opposed to a strength in say marine biology;
- With the split between management and technical input decided, a cost estimate for the EIA can be based on the resource requirement for resolving the risks involved; and
- The possible timing and weaknesses in seeking final approvals could be considered.

Training of staff would also follow the risk profile shown in Figure 2 with the majority of the work on noise control and stakeholder management. Similarly Environmental Monitoring and Audit would follow the major risks and should be aligned correspondingly.

The above analysis is a prioritizing of the risks included in the project risk register. As is currently the case the Corporation repeats the risk assessment at regular intervals to ensure that all previously identified and potentially new risks are identified and controlled in a consistent and cost-effective manner.

6. CARBON ASSESSMENT

The Hong Kong Government has signed onto the APEC agreement of reducing the Green House Gas (GHG) intensity by 20% by 2020 (GHG for a given Gross Domestic Product or GDP). At the COP-15 meeting in Copenhagen, China agreed to a 40-45% reduction in GHG intensity by 2020. It is expected that Hong Kong cannot perform worse than China and further and tighter carbon emission targets will be forthcoming.

At the time of writing this paper, there is no requirement to consider carbon in any manner when designing, constructing or operating infrastructure. The Corporation is taking the first steps in estimating the embodied carbon or ‘Capex’ and the electrical power consumption for operations ‘Recurrent’. The Capex assessment is considering carbon used from cradle to gate and gate to structure and is attempting to estimate at least 80 - 90% of the embodied carbon usage. It is expected that these assessments will supply a carbon assessment to an accuracy of 5%.

This will allow the following questions to be considered.

- What the proportion is of embodied vs. recurrent carbon for a railway project?
- Can and if so how should a rail project be designed to optimize carbon emission over the lifetime of the line?
- Can design assessments effectively be undertaken using embodied carbon with benefit and can that benefit be quantified?

Responses to these questions will be forthcoming.

7. CONCLUSIONS

This paper has illustrated how over time, the MTR Corporation has implemented a sustainable development perspective in developing its railway projects. The perspective is MTR's Sustainability Competitive Advantage model and considers a dynamic relationship between stakeholder engagement and risk management. A brief background and description of the model has been given. Details on stakeholder engagement and risk management of environmental issues have also been illustrated. A further identification of a new risk, a target on carbon emissions, has also been identified and the assessments that are currently underway have been introduced. It is concluded that the dynamic relationship between stakeholders and risk is applicable and one that could be implemented with direct benefit in Hong Kong.

8. REFERENCES

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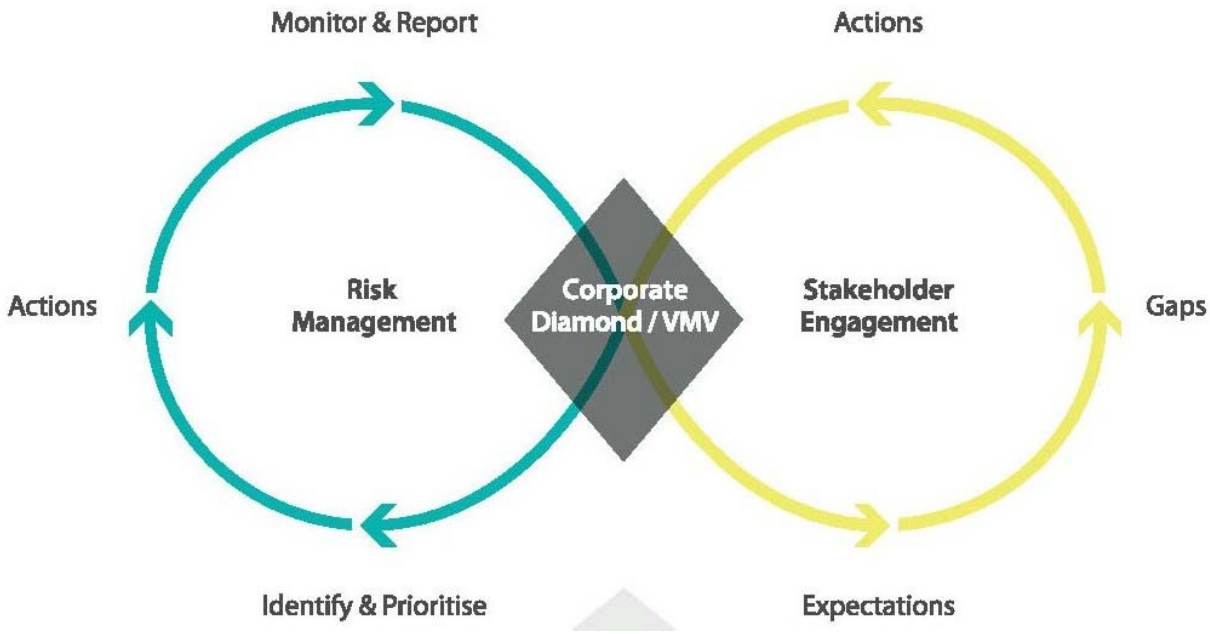

Figure 1. MTR Corporation Sustainable Competitive Advantage Model

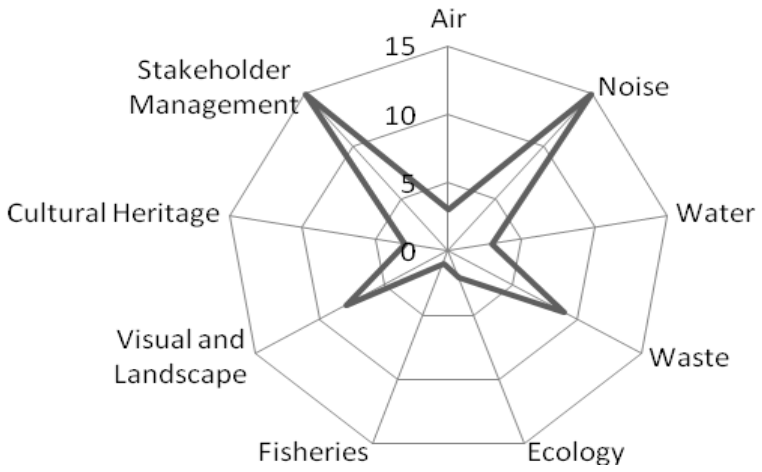

Figure 2. WIL Environmental Consequence Map

Table 1. Stakeholder Assessment

Assessment Criteria	**Rating**	**Comments**
	++ + 0 - --	
Clear Aim or Goal	●	Stop nuisance
Public understanding	●	Nuisance to 500 families
Symbolic	●	Small people vs. Big Company
Image can be damaged	●	MTR acted brutally
Strong opponent	●	MTR profitable in HK
Public can get involved	●	Public can pressure MTR
Confrontational	●	Land required
Dramatic elements	●	Occupation, struggle
Overall assessment	● | | | |	Pressure campaign

Table 2. WIL Estimation of Frequency, Probability and Consequence

Issue	Frequency	Probability	Consequence
Air	1	3	3
Noise	3	5	15
Water	1	3	3
Waste	3	3	9
Ecology	1	2	2
Fisheries	1	1	1
Landscape and Visual	2	4	8
Cultural Heritage	1	3	3
Stakeholder Management	3	5	15