AN INCENTIVISATION SCHEME FOR A MAJOR TRANSPORTATION INFRASTRUCTURE PROJECT IN THE UK

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Much of the discussion of key performance indicators (KPIs), quantitative benchmarks and other performance measures is concerned with engendering a new culture of collaborative working and partnerships in the construction industry with the ultimate objective of improving performance, predictability, and efficiency on individual projects. However, there can only be an effective implementation of these measures if constructors are truly engaged in the process of collaborative working. Therefore this research analyses the development and implementation of an incentive framework that is aimed at motivating both the Client and the Construction Partner to adopt new methods of working. A case study of a major infrastructure project in the UK is used to outline one such incentive framework. The principles of the incentive framework are analysed. The constraints, critical success factors, environment, and key deliverables of the project are examined. These aspects are then evaluated to show how they collectively informed behaviours and the potential to realise the incentivisation. The research has identified a two stage incentive scheme. The incentive scheme ensures the Delivery Partner Organisation (DPO) can gain from meeting performance criteria at stage 1. In addition the DPO will also share in any cost savings made at final account up to a capped limit. The DPO is prepared to share the in risk of financial loss at final account up to a capped limit.

Keywords: behaviours, critical success factors, incentivisation, key performance indicators, pain/gain, partnering.

INTRODUCTION

Major infrastructure projects often need to address a combination of diverse stakeholder drivers, the compound effect of which results in high levels of complexity and multiple, potentially competing constraints (Yeo K T, Ning J H 2004). There is a need to consider how these constraints can be overcome. One proposal is to set up an incentive scheme for the project management of these complex projects.

This paper is based upon research conducted on the redevelopment of a major infrastructure project in the UK. The project comprises of the redevelopment of a transport hub and its catalytic impact of regeneration of its surrounding environs, which in the long term, will contribute significantly to the region. The current interchange was built in the mid 1960s and is currently working at double its design capacity, this is one of Britain's major transport hubs.

Situated above the hub is a retail complex which contains shops, offices and a pedestrian thorough fare that provides links between various parts of the city. The project will be completed in two phases over the next 5 years. The scope of the project comprises of civil engineering, demolition, enabling works, new build and

refurbishment. The core development will generate £400 million of construction work and to catalyse over £2bn worth of economic regeneration based benefits. The challenge, for the client, is to establishing a single entity project team, from two separate organisations, working in collaboration and truly integrated in a mutually beneficial way (CIRA 2554 2004). Van Troong Luu, Soo Yong Kim Tuan-Anh Huynh argue that to ensure the client achieves best value for money the efficiency and performance of the project team is measured against a set of Key Performance Indicators (KPIs) that have agreed benchmarks and quantifiable outcomes . Alderman and Ivory (2007) points out that project risks are managed, by this team, with an appropriate gain/pain mechanism that is based on a single set of project performance outcomes. The aim of this paper is to analyse how the client of this major infrastructure project has developed and implemented an incentive framework within the constructs of a partnering culture.

Virtual delivery vehicle

The complex nature of the scheme requires a project management team with an extensive range of knowledge and experience on the infrastructure, retail operations and with access to cutting edge construction techniques. Because much of this expertise is outside the client's organisation and as a consequence the client has established a Virtual Delivery Vehicle (VDV) to manage the project (Figure 1). This VDV is comprised of people from both the client body and the Delivery Partner Organisation (DPO). The expectation being is that the client body would provide expertise related to transport infrastructure and the DPO would bring expertise in working on retail centres and major city centre refurbishment projects. To realise the potential synergy of the VDV the client has been proactive in developing a true partnering culture to ensure collaborative working relationships, seamless integration and alignment of business objectives to project objectives. This was done in order to share project risk. (Office of Government and Commerce HM Treasury: Managing Risks with DPOs)
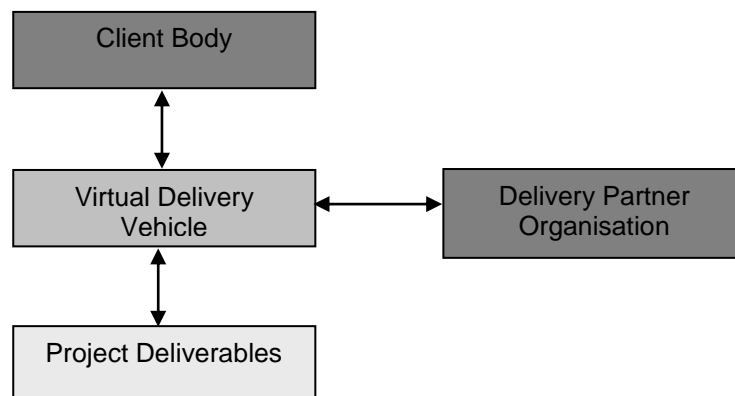
Figure 1: Project Configuration

The procurement of the DPO was a publically advertised multistage process with presentations, workshops and site visits (Anderson and Merna 2003). The client project management actively led the procurement process in order to develop a partnering culture, which is a less adversarial approach to construction projects, and reduces confrontation, delays and significant additional costs as identified in *The Latham Report 'Constructing the Team' (1994)*. The selection criteria for the engagement of a DPO did include traditional factors such as commercial viability and

technical knowledge. But other criteria that related directly to a partnering culture such as team integration, shared project objectives and collaborative working were also significant factors. In this project the cost element, though important, was not the prime consideration and other, "Soft Issues" played a prime role in the selection of the DPO.

As part of the procurement process the principles of an incentive framework, for the project, was introduced. Potential DPOs were invited to participate in the further development and refinement of this incentive scheme with commensurate risk allocated and equitable reward sharing.

INCENTIVE FRAMEWORK

Traditionally incentive schemes have been based upon the final account where cost savings are split on a pro-rata basis between the client and contractor and like wise cost where they share the pain of cost overruns (Ndekugri and Corbett 2004). The incentive framework, developed for this project, is based on a two stage process. This arrangement differs from other incentive schemes in construction, in that it is based primarily on measuring the performance of the VDV as a means of rewarding the DP based on the capitalisation on any cost savings. Conversely the DPO will contribute towards any cost overruns from its base profit and any performance incentive funds accrued. The extent of the DPO liability for any cost overruns is proportionate to its profitability with the risk that they are exposed to being capped to a value of any profits earned during the life of the contract. Actual costs incurred by the DPO are protected and maintained beyond the reach of the pain/gain arrangement. As part of the risk share process the DPO has offered to take a reduced profit (when compared to normal market expectations) as a baseline target for the cost of works.

The VDV's first level of performance incentive, which includes the Client's Project Team, is triggered by successfully meeting the criteria defined in the KPIs. This part of the incentive process is a gain only arrangement. This incentive payment is made from a Performance Fund has been ring fenced by the client. The total fund for the DPO for stage 1 of the incentive process comprises:

DPO Base Cost + At a Reduce Profit, when compared to normal market conditions

Performance Fund Earned

As illustrated in Figure 2 the collared and capped DPO Incentive Framework, which includes the gain only Performance Fund, limits the client's liability for incentive payments and equally limits the DPO's exposure to pain.
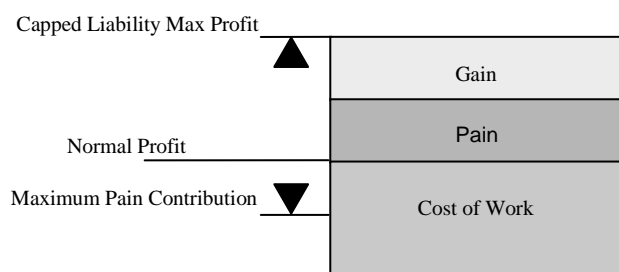

Figure 2: DPO Incentive Framework

Key Performance Indicators

Bayliss, Sai-On Cheung, Henry C.H Suen and Shek-Pui Wong (2004) identified that fundamental principles of incentive frameworks are to optimise performance level and provide appropriate rewards. The trigger mechanisms for incentive framework are Key Performance Indicators (KPIs) that are based upon objective and transparent criterion. The KPIs are quantifiable with benchmark norms and banding as shown in Figure 3). An example of a KPI is accident frequency rate (AFR). The norm for a particular project of a similar size and nature could be "loss, due to accident, of 100 hours per 10,000 of production". This establishes the bench mark norm. Prior to the commencement of the project the norm would be established. Achievable upper and lower limits agreed, with appropriate bandings. Any incentive payment would be triggered when performance levels exceeded the agreed norm.
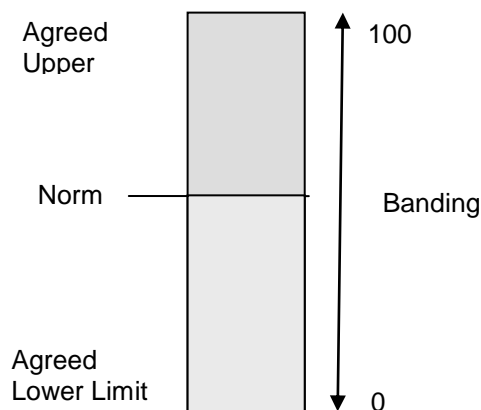

Figure 3: Key Performance Indicator Banding

Performance Incentive: Stage One Performance Incentive gain only

The performance incentive related to how the VDV manages the project and integrates with the client's ongoing operation of the transport interchange. Each of the 5 KPIs is measured at six milestones throughout the project. In Figure 4 the scope and description of each KPI remains constant but their weighting and benchmark scores will vary depending upon their priority at each stage. For example health & safety is always a major priority in construction but at start up phase of the project its significance as a weighted KPI is low. This is not to say that high levels of health and safety are not required to be achieved but rather it reflects the fact that the project is office based and not yet undertaking major physical works at that point in time. At the same time some of the other four KPIs may be more heavily weighted more heavily, as they are considered to be a high priority at this stage.

Finally each of the project milestones is weighted relative to its impact within the overall context of the whole project. Achievements recorded against the suite of KPIs at each milestone then trigger the release of a percentage of the client funded Performance Fund. The DPO's payment for the performance fund is entirely dependent on the performance of the whole VDV which is measured against the KPIs. The performance incentive payment to the DPO, at any one milestone, is calculated by the summation of each KPI weighting multiplied by each performance rating achieved multiplied by the performance fund available at that milestone.
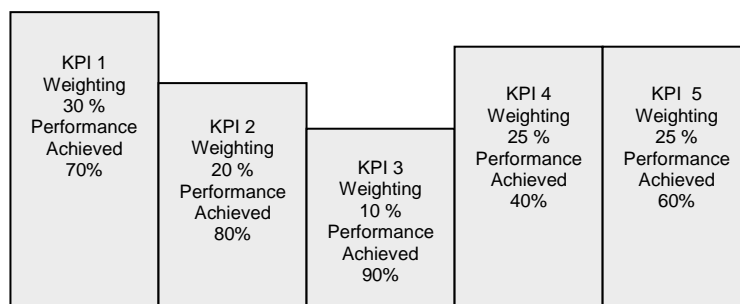
Figure 4 Stage One Incentive Payment Calculations

The performance incentive is calculated by:

$$\sum (70 \times 0^.3) + (80 \times 0^.2) + (90 \times 0^.1) + (40 \times 0^.25) + (60 \times 0^.25)$$

This equates to $\quad\sum 14 + 24 + 9 + 10 + 15 = 72\%$

Performance fund available at this milestone say £200,000

Performance fund paid to DPO at this milestone:

£200,000 x 72% = £144,000

Client Funded Performance Incentive 1st Stage

The client's Performance Fund is paid at milestones through the project. Each of the milestones is weighted to reflect their importance at key stages. The performance percentage the DPO achieves at each milestone is aggregated. This aggregation represents the DPO's overall performance for the entire project and is calculated by the summation of percentage achieved at each milestone multiplied by the weighting of each milestone illustrated in Table 1. The overall percentage performance the DPO achieved.

Table 1: KPIs and Milestone Weighting

KPI Weighting for each Milestone	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5	Milestone 6
KPI 1	20%	30%	10%	10%	10%	30%
KPI 2	10%	10%	30%	10%	10%	10%
KPI 3	30%	10%	10%	10%	40%	30%
KPI 4	30%	30%	30%	30%	30%	10%
KPI 5	20%	20%	20%	40%	10%	20%
Total for 5 KPIs	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Allocated Overall Performance Fund Distribution	30%	10%	20%	10%	10%	20%
Actual Performance achieved	75%	81%	79%	80%	83%	88%
Weighted Performance %	22.5%	8.1%	15.8%	8%	8.3%	17.3%
Aggregated Performance Total	80.3%					

Cost Saving Fund Incentive: 2nd Stage: (Pain or Gain)

The Cost Saving Fund Incentive scheme (See Figure 5) is based upon the gain/pain principle where any saving made at the final account outside the acceptable variant norm of the original estimate will be share with the DPO. The estimated cost of the

design and build for the project is established and has an acceptable variant of plus or minus 2.5 % (Ref) Any deviation at the final account that falls within the acceptable variant will not trigger the incentive mechanism, this is classified as the Dead Zone.
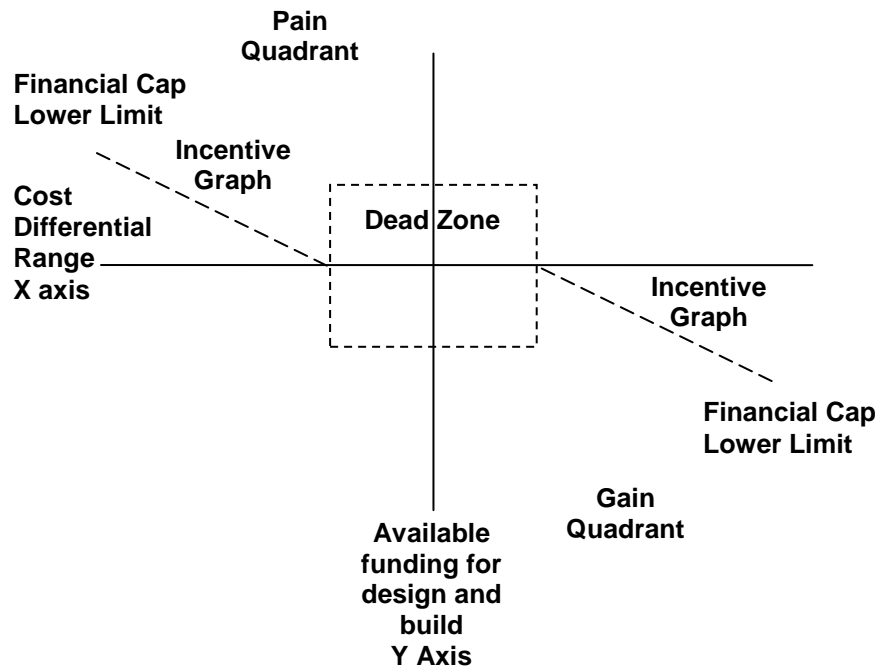

Figure 5 Second Stage Incentive Model

Stage Two of the incentive fund mechanism, illustrated in Figure 5, comprises 9 elements which are:

- Estimated Cost: Available funding for the design and build of the project. Y Axis
- Cost Differential Range: Sets the out limits (the cap and the collar points) of the incentive scheme. X axis.
- Gain Share: Agreed sharing proportion of savings (say 30% to DPO) of the overall under spend. That is any savings made are shared on a basis of 70% client, 30% DPO. The total value of gain that can be earned by the DPO is however capped at a pre-agreed figure. Monies saved in excess of the cap are retained by the client.
- Pain Share: The DPO will lose a proportion of their aggregated Stage 1 performance incentive plus its base profit in relation to any cost overrun up to a maximum limit. The maximum limit will be the total of any profits earned by the DPO. The pain proportion is agreed at the outset of the contract i.e. 30% of any overrun cost. Beyond the point where 100% of the profits earned by the DPO have been lost the client then bears 100% of any cost overrun.
- Dead Zone: Acceptable variant of the estimated cost plus or minus 2.5 %. Any deviation at the final account that falls within the acceptable variant and does not trigger gain/pain share mechanism.
- Incentive Graph: A linear xy graph that runs from the median estimate based on available funding for the design and build to the cap limit in both the gain/pain quadrants. Any variation, at the final account, from the estimated available funding is plotted along this line which will trigger the incentive mechanism if it falls outside the Dead Zone. If the value of the saving or overspend does fall

outside the Dead Zone then all cost savings or overruns include the proportion within the Dead Zone
- Collar Lower Limit: The financial cap for the lower limit is:
- DPO's base profit + Performance fund
- Financial Cap Upper Limit: Plus 30% of the final account up to the agreed cap - estimated funding for design and build
- DPO Performance Percentage: Defines the proportion of any saving incentive that will be made to the DPO: Total saving at final Account - 70% Client Split x Performance Percentage

Cost Saving Fund Incentive Payment Calculation

The calculation for pain/gain payment in the second stage of the incentive framework is dependent upon any savings/overruns at final account and the aggregated first stage performance percentage achieved by the DPO, In the event of any cost savings at final account that are greater than the Dead Zone limits the DPO will be entitled to a share of these benefits. To illustrate how the second stage incentive scheme is calculated the following illustrative project data will be used.

Table 2: Illustrative Project Data

Key Elements	Illustrative Figures	
Stage One Aggregate Performance Total%	80.3%	Established in Incentive Stage 1
Base Profit Entitlement	£5,000,000	Minimum DPO Profit Established at Contract Award
Dead Zone Range	£10,000,000	Established at Contract Award - Based on the expected degree estimating accuracy. Outside incentive payment zone
Example 1: Total Cost Saving	£15,000,000	Saving on Final Account for the overall project £15m
Example 2 Cost Overrun	-£20,000,000	Final Account for the overall project exceeds funding by £20m
Share Proportion: DPO	30%	Established at Contract Award
Share Proportion: Client	70%	Established at Contract Award
Stage 1: Gain Earned	£5,000,000	Calculated Amount

Stage 2 incentive earned calculation:

Total Cost Saving – Dead Zone Range x DPO Share Percentage x Stage 1 Aggregate Performance Total%

(£15,000,000-£10,000,000) x 30% x 80.3% = £1,204,000

Table 3: Example 1: Final Construction Cost Below Available Funding Level

Key Elements	Illustrative Figures
Base Profit Entitlement	£5,000,000
Stage 1: Incentive Earned	£3,000,000
Stage 2: Incentive Earned	£1,204,000
Total Profit Earned	£9,204,000

Total profit earned by DPO = Base Profit Entitlement + Stage One Incentive Earned + Stage Two Incentive Earned.

Stage 2 Pain share is calculated by:

Cost Overrun – Dead Zone x Percentage DPO Risk Liability of Cost overrun x DPO Share Percentage x Maximum Aggregated Performance achievable from Stage One – Actual Aggregated Performance achieved

(£-20,000,000 – £10,000,000) x 40% x 30% x (100% − 80.3%) = 2,364,000

Table 4: Example 2: Final Construction Cost Exceeds Available Funding Level

Key Elements	Illustrative Figures
Base Profit Entitlement	£5,000,000
Stage 1: Incentive Earned	£3,000,000
Stage 2: Pain Incurred	(£2,364,000)
Total Profit Earned	£5,636,000

Total profit earned by DPO = Base Profit Entitlement + Stage 1 Incentive Earned – Stage 2 Pain Incurred.

If pain incurred at Stage 2 is equal to or greater than the Base Profit Entitlement plus Stage 1 Incentive Earned then maximum loss to the DPO is equal to the Base Profit Entitlement plus Stage 1 Incentive Earned.

The two stage incentive scheme has been developed to ensure the DPO can benefit from increase performance in managing and integrating with the client's project team and share in any cost saving that are achieved at the final account and the client can demonstrate value for money in the engagement of the DPO.

The potential cost saving that the DPO can gain is capped at a pre-agreed point. The rationale for this cap is to ensure that the DPO is not seen to be making excessive profits from what is a public funded project.

Conversely the DPO exposes any gains that it has secured through the performance incentive. The proportion of loss of the DPO performance incentive is defined on the X axis on a linear scale graduated up to a capped point that is equal to it total profits generated by its activities.
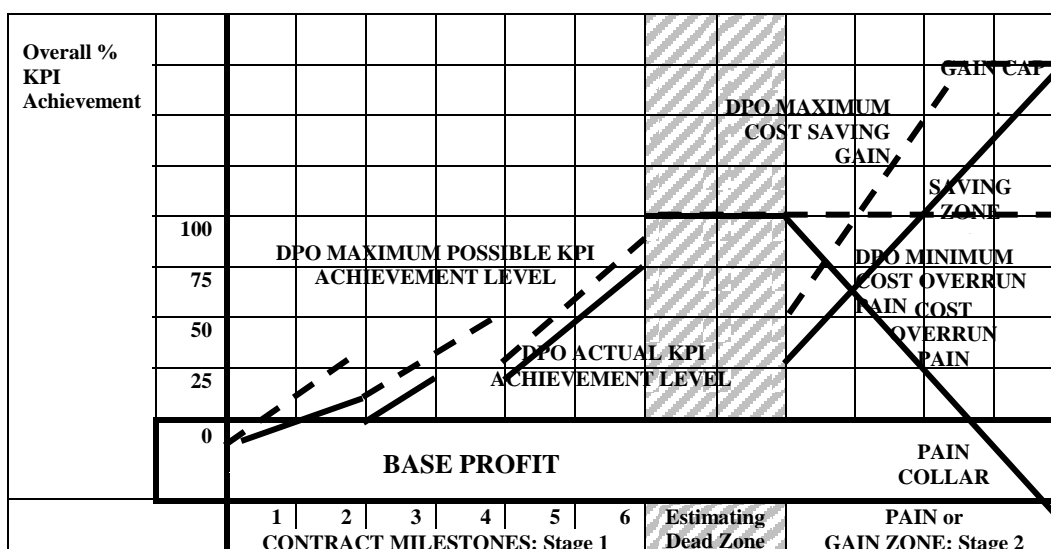

Figure 6 Two Stage Incentive Model

Figure 6 shows that even through the two stages of the model run independently the amount the DPO will receive for any cost savings at final account is directly linked to the DPO aggregated percentage performance calculated throughout the project. This

ensures the client can demonstrate best value for money in the engagement of the DPO.

CONCLUSIONS

The complex nature of infrastructure projects requires a paradigm shift in the way clients engage with the construction industry. There is a requirement to move from adversarial contracts to one of collaboration, shared project objectives and shared project risk. The project will be delivered via a Virtual Project Vehicle that includes an internal project team and a third party DPO.

There was a multi-staged procurement process when engaging the DPO as the client wanted to ensure that a collaborative seamless integration was developed with the client project team. As the project is publically funded the client has to show transparency and accountability in its processes and ensure value for money. To achieve these goals an incentive framework has been introduced.

This framework provides an incentive for all parties to perform to the highest level and share in the benefits of this. The project is still in its early stages the core principles are agreed being worked to but the incentive framework can not said to have been fully tested until the final account is agreed.

There is clear evidence that both parties have entered into this framework in a cooperative sprit with each party prepared to share project risk. The mechanism of pain/share has been established and the client has cost certainty with the liability cap.

The DPO has demonstrated that it is prepared to take an initial reduced profit in the knowledge that high performance will deliver a disproportionately higher profit yield. This measure of performance is dependent upon the KPIs triggers and their objective assessment. To avoid possible disputes over KPIs all parties enter in to early and open consultation over the exact KPIs for the project and their benchmark. The DPO also has the opportunity to benefit further from interim payments under the stage 1 arrangements of the incentive framework by receiving a payment at each milestone based upon the success of the VDV against the KPIs. Both parties are aware that the result of the aggregation of achievements at each milestone, and any under performance will inform the aggregated total to be applied to stage 2 of the agreement. The incentive mechanism is fully transparent and allows the client to benefit from savings made against available funding. The client has also reduced its risk by sharing it with the DPO at each milestone and this is also shared the risk.

It is clear from this case study that the formation of a truly incentivised partnering arrangement between the Client and the DPO has been achieved. Analysis of the project has shown that the client has been proactive in developing and implementing a partnering culture from the inception phase of the project. All parties have displayed a willingness to share the project risk in return for an incentive to match performance.

All parties realise that this is the first stage of the process of developing a true partnering culture and in the dynamic environment of the project strains will be placed upon the alliance. All parties have worked to achieve this partnership at the procurement stage but they understand that this is a continual process and will require as much effort to maintain as to create.

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