



Engineering, Construction and Architectural Management

Emerald Article: Is incentivisation significant in ensuring successful partnered projects?

Deborah Hughes, Trefor Williams, Zhaomin Ren

Article information:

To cite this document: Deborah Hughes, Trefor Williams, Zhaomin Ren, (2012), "Is incentivisation significant in ensuring successful partnered projects?", Engineering, Construction and Architectural Management, Vol. 19 Iss: 3 pp. 306 - 319

Permanent link to this document:

<http://dx.doi.org/10.1108/09699981211219625>

Downloaded on: 10-05-2012

References: This document contains references to 23 other documents

To copy this document: permissions@emeraldinsight.com

Access to this document was granted through an Emerald subscription provided by Emerald Author Access

For Authors:

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service. Information about how to choose which publication to write for and submission guidelines are available for all. Additional help for authors is available for Emerald subscribers. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

With over forty years' experience, Emerald Group Publishing is a leading independent publisher of global research with impact in business, society, public policy and education. In total, Emerald publishes over 275 journals and more than 130 book series, as well as an extensive range of online products and services. Emerald is both COUNTER 3 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.



Is incentivisation significant in ensuring successful partnered projects?

Deborah Hughes, Trefor Williams and Zhaomin Ren
Built Environment Division, Glamorgan University, Pontypridd, UK

Abstract

Purpose – This research aimed to test the hypothesis “The use of incentivisation with a gain/pain share of about 15 per cent is a precursor to the achievement of successful infrastructure partnering projects in South Wales”. This hypothesis arose from Egan’s speech in 2008 discussing the success of partnering.

Design/methodology/approach – Two infrastructure projects in South Wales were chosen for the study. This research demonstrates that partnering is not suitable for all projects. Incentivisation places a focus on cost that can have a detrimental effect on the other aspects that exist within the oft quoted triangle of time, cost and quality.

Findings – Neither of the two case projects can be judged a success from the perspective of both parties. What represents success to one client would not equal success to the other. Overall it must be concluded that the hypothesis was not proven. Egan’s view appears to be too simplistic to apply in all situations and is not always the key to success as he suggests.

Originality/value – This paper makes an original contribution by exploring if incentivisation can provide success within infrastructure projects in South Wales. The content of the paper will be of interest to clients, contractors and consultants engaged in formulating partnering contracts.

Keywords Construction, Incentive, Partnering, Pain/gain share, Target cost, Construction industry, Incentives (psychology), Partnership

Paper type Case study

Introduction

Construction has a history of adversarial relationships and an uneven balance of risk being carried by the parties. The main stakeholders (e.g. client, engineer, architect, contractor and suppliers) are frequently strangers to one another, but are expected to cooperate in order to design and construct products that are often complex and unique in nature. These stakeholders often lack the motivation to work together voluntarily, as there is a conflict of interests between benefiting the project and personal benefit. This conflict within the construction industry has been seen as the critical factor resulting in low productivity, poor performance and competitiveness.

This led to Latham (1994) and Egan (1998) amongst others to examine the industry and how this adversarial culture could be changed. Collaborative working and partnering was seen as the answer to the low performance of construction and the lack of client satisfaction. There has been increasing recognition that collaborative working, as one of the most important critical success factors for operating construction projects, has become the core of new management paradigms in construction community.

Partnering does not automatically mean success. Some researchers are very positive about partnering and highlight the financial savings and the opportunity for innovation while others feel it is a chance for exploitation (Cheung *et al.*, 2003). The



early work on partnering suggested that incentives would be useful in producing a measurable improvement in achievement (Saad *et al.*, 2002). Egan, in “Rethinking construction” (Egan, 1998), discusses how the benefits of improved construction should be shared amongst everyone not just the client. This hinted at an incentive idea.

Various incentive mechanisms have been used to promote collaborative working and partnership in the industry. For example, contracts have also been introduced which include incentives generally called target cost contracts or cost-plus-incentive-fee contracts (Broome and Perry, 2002). Incentives include financial or non-financial or a combination of the two. With an appropriate incentive mechanism, project partners are rewarded for significant performance. However, it is always difficult to develop an appropriate incentive mechanism as different partners often have conflicting interests.

The year 2008 marked the tenth anniversary of Sir John Egan’s report “Rethinking construction”. During a speech in May, he stated:

In summary, I guess if I were giving marks out of 10 after 10 years, I’d probably only give the industry about 4 out of 10 and that’s basically for trying. I have to say that I would introduce, as early as possible in every possible project, a gain share between the client and the industry, with a target based upon an agreed set of parameters, plus or minus I would say 15% (Egan, 2008).

Egan does not seem to feel that incentivisation is currently working as well as it could. Inspired by this, this research aims to examine if the use of incentivisation is a precursor to the achievement of successful partnered projects within infrastructure projects in South Wales and whether the level that the gain/pain share is set at is significant for achieving a successful project.

Some of the important research questions answered are:

- Should incentivisation be used on every project?
- Should the target cost (the predicted total cost for the project) and incentive be set as early as possible?
- Should the incentives be set at 15 per cent?
- Should the incentives be the same for pain share and gain share?
- What factors are important in an incentive scheme?

The paper firstly reviews the key concepts such as partnering, incentivisation, motivation and success; both questionnaire and interview were adopted to obtain the primary data. The received data was then analysed and compared with the data obtained from secondary sources. Finally the hypothesis is addressed and a conclusion reached.

Incentives in partnering

Incentives are used to motivate personnel or a party to behave in a certain manner or to achieve set targets. They can be financial, non-financial or a combination (CIRIA, 2001). Incentives work by increasing motivation, which encourages the correct behaviour and increases effort (Mohd-Sanusi and Mohd-Iskandar, 2007).

Given its importance, many researchers have examined how incentives may affect a business relationship. For example, Himes (1995) emphasised that incentives should

focus on the objectives of all parties in the same direction. Partnering should be based on trust, dedication to common goals, and an understanding of each other's individual expectations and values. Incentives are seen as a method of building such trust, especially calculus trust (Bresnen and Marshall, 2000). Bayliss *et al.* (2004) found that out of nine key elements for partnering, incentives and review meetings were the most influential in maintaining the partnering spirit. Cheung *et al.* (2003) suggest that incentives improve trust by suppressing the sources of mistrust.

Das and Teng (2001) indicated that equity was important in a partnership and the feeling that one partner gained more from the partnership might cause them to commit less to the partnership. Cheung *et al.* (2005) noted that only the client benefited from the partnering arrangement, while the contractor absorbed the extra cost of partnering arrangement to increase the chances of further work. Naoum (2003) discussed how incentives, if used correctly, could be used to improve project participants' performance based on the client's priorities. Kadefors (2005) revealed that incentives were complicated in partnering because not all members might be working for the best interest of the project and there might be "free-rider" problems. Inappropriate incentives could bring about self-interest rather than the benevolent attitude required in the partnering project. Milne (2007) discussed how reward and recognition programmes worked very well in motivating individuals but that teams were not so easy to motivate.

Egan (1998) discussed how every member of the partnership should make a fair and reasonable return. Bayliss *et al.* (2004) argued the need to share the incentives amongst all the key personnel. Eriksson *et al.* (2007) concluded that incentives were focused on the main contractor and client relationship and occasionally with the consultants. Sappington (1991) argued that since construction performance is very hard to judge, incentives should be set on the target cost rather than on the success of the project in terms of quality and time. Espling and Olsson (2004) found the agreed gain/pain share was 30 per cent between the client and the contractor but no reasoning was provided for this level. Badenfelt (2007) used mathematics to calculate the appropriate levels of incentives. The starting point was to calculate the target cost. From this, the level of contractors sharing ratio of either the savings or loss made on the project and pain/gain could be set. Al-Harbi (1998) concluded that it was important that contractors and client came to an agreement together about the value of the pain/gain.

Badenfelt (2007) states that usually, the higher the sharing ratio used, the larger the incentive to reduce cost. He used the level of perceived risk to calculate the level of incentive, which is difficult to value. He also studied how traditionally the higher the sharing ratio, the higher the perceived risk involved in the project and vice versa. In working out the sharing ratio the client and contractor need to discuss their attitudes to risk, and the probability of achieving the set target cost. In Eriksson and Laan's (2007) study, they found that to encourage the contractor to set a realistic target cost the contractor was offered 70 per cent of the savings but only 30 per cent of the losses. The earlier the contractors were involved in the process the less the target cost was altered; the target cost became more accurate the longer the client and contractor work together. Black *et al.* (2000) summarised that adjusting price was the most difficult of procedures to establish within partnering and it was important that cost control was maintained.

Despite all the research, no conclusions could be drawn on at what level of incentivisation would be acceptable to both the client and the contractor, how early the target cost should be set and if partnering with incentivisation is suitable for all projects. There is not clear support to Egan's (2008) view. Previous studies show how to calculate the target cost for a project but there is a lack of follow up research on if this is "acceptable" to both parties. The following research investigated this issue as well as the key factors in producing a successful partnered project.

Methodology

Two case studies were conducted to investigate the hypothesis that the use of incentivisation is a precursor to the achievement of successful partnered projects within infrastructure projects in South Wales and the level that the gain/pain share is set at is significant for achieving a successful project. Two infrastructure projects were chosen and both had or were using incentive contracts within a partnering arrangement. The two projects also allow a comparison to be made between the differing approaches to the use of partnering within projects. Basic information of the two case projects is given in Table I.

Questionnaires and interviews were used to gather both breadth and depth of data from within these two case projects. The questionnaire was designed to ask about four areas affecting the success of using incentives on partnering projects in order to test the hypothesis. These areas were: project success factors, aspects of incentives, key incentive issues and level of pain gain. The questions were written with both negative and positive statements so that the respondents found it difficult to guess the answer that the researcher wanted. A pilot study was conducted before the final questionnaire was sent out with only minor improvements to aid understanding.

Thirty questionnaires were sent out and twenty eight of the questionnaires were returned which gave an 85 per cent return rate; 20 of the questionnaires were completed from people who worked on Project A while eight were completed by people

	Project A	Project B
Type of project	Infrastructure Ongoing maintenance, repair and updating of utilities	Infrastructure Dockside regeneration scheme, constructing road and services infrastructures for a mixed residential, commercial and leisure development
Location	South Wales	South Wales
Client	Utilities company	Government
Contract	NEC option C This is a target contract with an activity schedule	NEC option C This is a target contract with an activity schedule
Form of partnering	Strategic	Tactical
Partnering charter	Yes	No
Project period	16 + years	2 years
Incentive scheme	Yes	Yes
Target cost	Set early	Set when design 90 per cent complete
Pain/gain share	Varies, pain set higher than gain	20 per cent
Value	£200m	£3m

Table I.
Basic information of the two case projects

who worked on Project B. A total of 80 per cent of Project B personnel were questioned and 20 per cent of Project A personnel were questioned. This was due to the relative sizes of the projects. An appropriate confidence level was necessary, which required a minimum of 18 per cent sample. The majority of personnel targeted were cost and contract managers (see Table II), and all were directly affected by incentivisation and were selected from both the client and the contractor in equal numbers. An experienced sample of people was approached. Seventy-one per cent of the respondents had at least four years' involvement up to 25 + years within a partnering arrangement.

The responses to the questionnaires were analysed and then used to form the basis of the interview questions. The collected data was coded and analysed using the Statistical Package for the Social Sciences (SPSS). The statistical tests carried out on the resulting data were:

- χ^2 test;
- unrelated *t*-test; and
- Spearman's ρ correlation.

Structured interviews were adopted so that analysis was made easier. The questions asked were designed to further explore their answers in the questionnaire. For project A, four people were interviewed and for project B, two people were interviewed. This provided a range of views. Details of the interviewees are shown in Table II.

Findings and analysis

Below are the outcomes of questionnaire and interview. The latter is conducted based on the former.

Questionnaire results

Project success factors. This questionnaire tried to gauge the degree of success seen in partnering projects. All the questions together aims to collect data which is scarce or missing from the literature on incentivisation and “success” from contract managers, cost managers, clients and project managers working on infrastructure projects within South Wales. The respondents were asked how many of the partnering projects, that they had been involved with, would they consider successful.

Figure 1 shows that most personnel asked, felt that the majority of the partnering projects they had been involved with had been successful. The respondents from Project A are more positive about partnering and felt that most of the projects were successful. However respondents from Project B felt that only some of the projects were successful and no one felt that all the projects had been successful.

Table II.
Interviewees

Project A	Project B
Contractor (Cost Manager), 8 years' experience	Contractor (Cost Manager), 8 years' experience
Client (Project Manager), 10 + years' experience	Client (Project Manager), 6 years' experience
Client (Cost Manager), 25 + years' experience	
Contractor (Cost Manager), 9 years' experience	

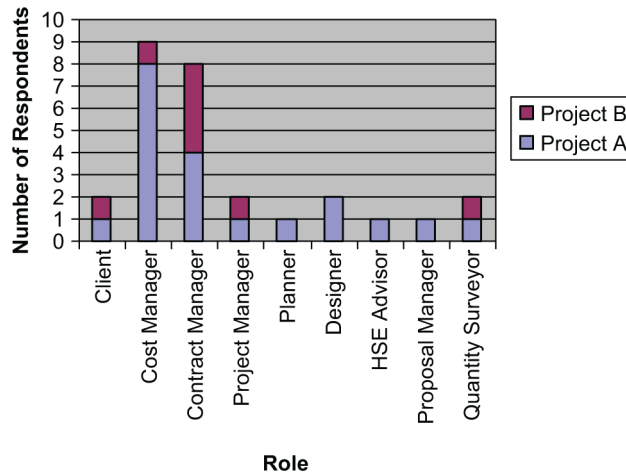


Figure 1.
Number and role of
questionnaire respondents

The respondents were then further asked how they define the success of a partnering project. This question indicates what project participants mostly expected. In other words, which incentives are most effective? A series of key factors were required to be ranked. These key factors were taken from the literature but the questionnaire also gave them a chance to add their own. Table III illustrates the results. Not surprisingly, cost, quality, time and safety were ranked as the top four successful factors for partnering projects.

Aspects of incentives. This component looks at aspects of incentives and tries to gauge the strength of feeling about some of the potential problems that have been identified by previous studies. Six statements (shown in Table IV) were presented to the respondent and they were asked to indicate their opinion using a seven-point Likert scale.

The results shown in Table IV indicate that most of the questionnaire respondents agreed that the target cost should be set early. Respondents also indicated that they felt, the use of incentives help make partnered projects successful.

Most respondents were neutral to positive about how partnering arrangement performance measurement data has provided the establishment of accurate target costs. This neutrality probably arises because of a lack of actual cost data collection or utilisation being incorporated within target costs. Respondents generally agreed that the use of incentives provides an alignment of objectives. The client of Project B,

	Project A (per cent)	Project B (per cent)	Overall (per cent)	Rank
Project brought in on target	10.2	6.5	8.3	1
Project built to a high standard	10.5	9.5	10.0	2
Project on schedule/time	12.6	10.1	11.3	3
No notifiable accidents	9.4	13.1	11.3	4
Few major defects	16.6	17.4	17.0	5
No major disputes	19.7	20.8	20.3	6
Team spirit	21.0	22.6	21.8	7

Table III.
Key factors in a
“successful” project

Table IV.
Results for respondents’
feelings about
incentivisation

		Statements						
Project	Opinion	Set target early (per cent)	Projects don't need incentives (per cent)	Performance informs target costs (per cent)	Incentives aligns objectives (per cent)	Target cost must be realistic (per cent)	Target cost is often set too high (per cent)	
A	Agree	75	55	55	60	90	55	
	Neutral	20	15	25	15	0	25	
	Disagree	5	30	20	10	5	20	
B	Agree	75	12.5	25	62.5	87.5	62.5	
	Neutral	0	0	50	0	0	12.5	
	Disagree	25	87.5	25	37.5	12.5	25	
Overall	Agree	75	33.8	40	61.25	88.8	58.8	
	Neutral	10	7.5	37.5	7.5	0	18.8	
	Disagree	15	58.8	22.5	23.8	8.8	22.5	

however, did not agree that it provided alignment and the agreement is quite weak as if it is only part of what is required to align objectives.

The respondents agreed strongly with the statement that the target cost must be realistic. This seems to be because both projects have struggled with producing accurate target costs. Respondents agreed that the target cost is set too high. Most of the respondents feel that the target cost is high while the contractor's people feel it is too low. The contractor is currently in pain not gain therefore perception is perhaps different to the reality.

Key incentive issues. This question aimed to identify how effective incentive schemes can be developed. The respondents were asked to rank a series of key factors in establishing and maintaining an effective incentive scheme within a partnering arrangement. As shown in Figure 2, the rank of the key incentive issues is:

- clearly defined objectives;
- known design parameters;
- mutual objectives;
- positive attitude in parties involved;
- the correct contractor;
- structural risk management process;
- reliable cost data;
- level of pain/gain satisfactory for all; and
- target cost set early.

The level of pain/gain was ranked higher by Project A than by Project B, who ranked it last (see Figure 3). Project A ranked "positive attitude" at the top while Project B ranked it four places lower in the middle of the rank order. However the largest difference was found in "correct contractor". Project A ranked this at the bottom while Project B ranked it third. Project B started with an unclear design that changed frequently during construction. Therefore Project B rated "clearly defined objectives" and "known design parameters" for this reason. The "correct contractor" was rated so

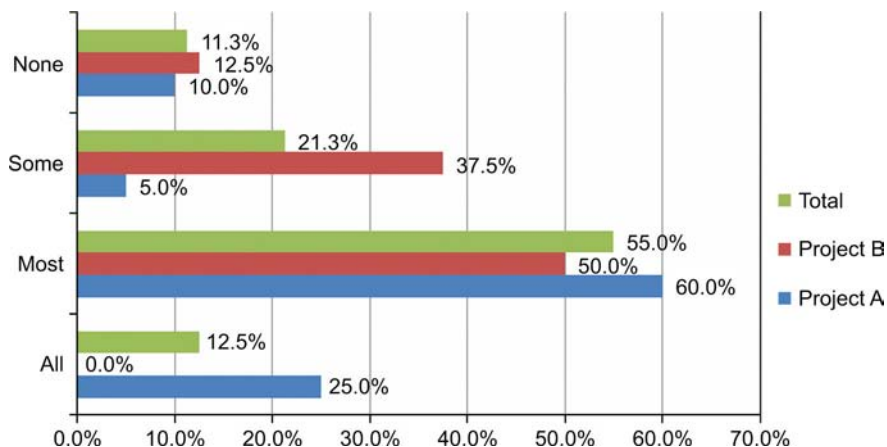


Figure 2.
Degree of "success" in
partnered project using
incentivisation

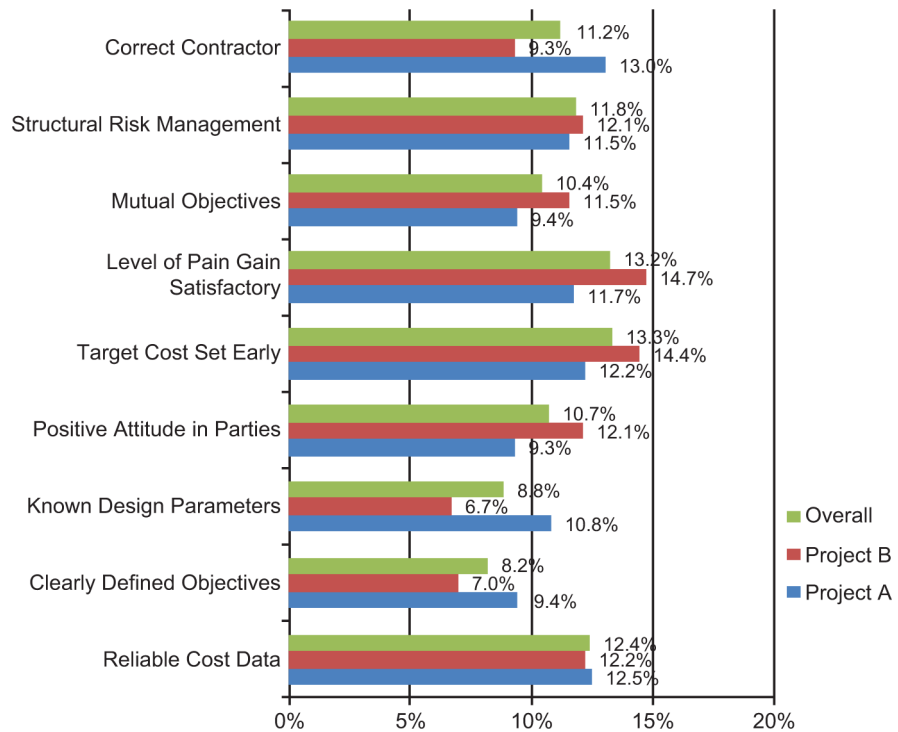


Figure 3.
Key factors for an effective
incentive scheme

highly by Project B because it was a one-off project and the contractor stalled on agreeing a target cost. Project A rated “positive attitude” highly because during the interviews they discussed the distrust that exists in the partnering team. Project A also placed more emphasis on the “level of pain/gain” because all parties except the client realise that the skewed pain share/gain share does not help the win-win idea of partnering.

The Spearman’s ρ statistical test was carried out in order to ascertain if there is any correlation between any of the factors. The test provided three significant results:

- (1) “Clearly defined objectives” has a positive correlation against “level of pain/gain satisfactory to both parties”. The correlation coefficient achieved was 0.469 with a significance of 0.012. This is a moderate relationship, which means that if people feel that clearly defined objectives are required they also tend to feel that the level of pain/gain should be satisfactory to both parties and vice versa.
- (2) “Clearly defined objectives” has a positive correlation against “mutual objectives”. The correlation coefficient achieved was 0.384 with a significance of 0.044. This is also a moderate relationship. If people feel that clearly defined objectives are important, they tend to feel that the objectives should be mutual.
- (3) “Positive attitude in parties involved” has a positive correlation against “level of pain/gain satisfactory for both parties”. The correlation coefficient achieved was 0.391 with a significance of 0.040. This is a weak relationship. This means that if they feel that “positive attitude in parties involved” is important they will likely also feel that the level of pain/gain should be satisfactory to both parties.

Level of pain/gain. This question aimed to examine whether participants agreed or disagreed with Egan's statement (i.e. "I would introduce, as early as possible in every possible project, a gain share between the client and the industry, with a target based upon an agreed set of parameters, plus or minus I would say 15%"). In order to examine what parts people agreed or disagreed with, the statement was divided into its three component parts:

- (1) every project should use incentives;
- (2) the target cost should be set as early as possible; and
- (3) the incentive should be set at 15 per cent pain/gain.

The results are provided as percentages throughout the paper, as the number of respondents was greater for Project A than Project B; therefore to avoid an unfair bias towards Project A's results percentages have been used. To test the statistical significance of these results, χ^2 tests were carried out. However, the results provided a significance greater than 0.05 and therefore there was no statistically significant differences between the number of people within Project A and Project B, indicating that statistically, both Projects A and B share similar opinions about Egan's statement (see Figure 4).

Interview results

The interview works as a complement to the answers to the responses to the questionnaire. The following is a summary of the interview results (for details, see Hughes, 2010).

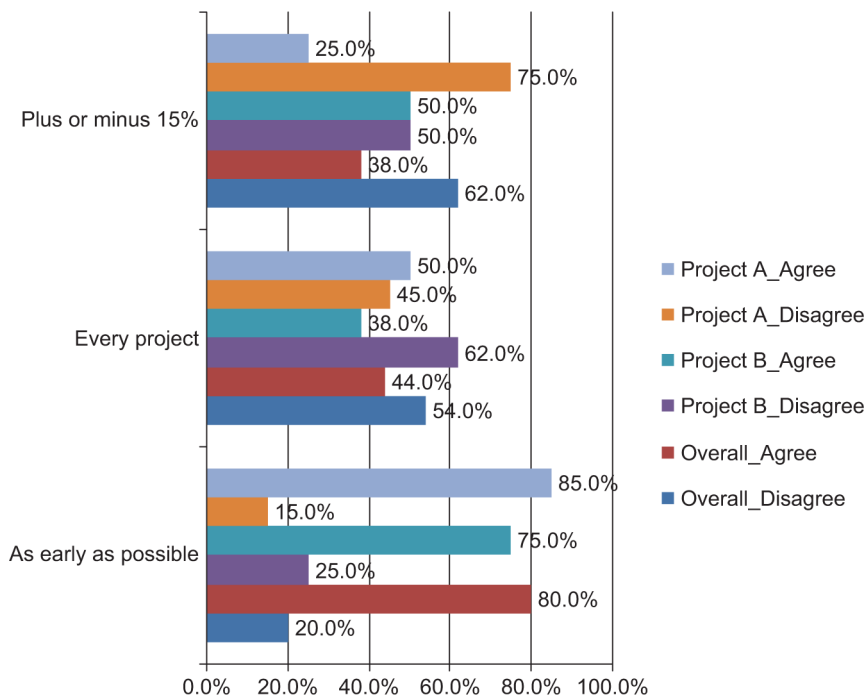


Figure 4.
Opinions on Egan's statement

The contractors in Project A (Con_ProA) thought that the pain/gain share percentage was not as important as the pain/gain share being equal and that the process was based on an accurate target cost. The contractors for Project B (Con_ProB) also felt that the pain/gain share should be equal but felt that the 15 per cent suggested by Egan (2008) was too low. Con_ProA felt that incentives could produce a successful project if it allowed value management but realised it produced a focus on cost. Con_ProB agreed with the financial focus and that incentives only work correctly if the client's focus was cost and not quality or time. When asked about the accuracy of the target costs, the contractors for Projects A and B felt that the target costs were not accurate. Con_ProA calculated the target cost from a mixture of first principles and previous projects but Con_ProB calculated from first principles. Both Con_ProA and Con_ProB felt that the drawings need to be almost complete before the target cost was set. Con_ProA felt that early on they did not have sufficient information to set an accurate target cost while Con_ProB thought that they had more of an advantage early on. Both Con_ProA and Con_ProB agreed that quality costs and incentives placed the focus on reducing cost. Furthermore, they agreed that incentives could work but that they were not working for those particular projects.

When the clients were asked about Egan's suggestion of a pain/gain share of 15 per cent, both Projects A and B felt that 15 per cent was fine. The client's representative from Project A (Cli_ProA) felt that the pain/gain share should be the same. When asked if incentives produce a successful project the clients for both Projects A and B agree that this is only true if the clients focus is on cost. Cli_ProA was more positive that the target costs were accurate whereas Cli_ProB felt that the target cost was not always accurate. The target cost for both Projects A and B were calculated by first principles according to the clients. Cli_ProA generally wanted to set the target cost at a slightly later point while Cli_ProB said that the target cost should not be set too early. Cli_ProA said that the drawings should be 70 per cent complete while Cli_ProB said that the risks need to be identified first of all. When asked if incentives provides the quality required, the clients for both A and B agreed that quality could suffer and Cli_ProB stressed the important of choosing the correct contractors. Finally both clients agreed that incentives could work but Cli_ProB stressed the point about identifying risk so that contractors did not go into pain.

The interviewees from both projects stressed the need for the gain/pain share to be equal and that the percentage should change with particular project. The contractors want a higher percentage than the client wishes to give for both Projects A and B. The contractors and clients for both Projects A and B believed that incentives focused on project cost. The clients for both Projects A and B felt that project quality could suffer if the inappropriate contractor was selected based on cost only. The contractors for both Projects A and B felt that they did not calculate the target cost accurately which was confirmed by Cli_ProB while Cli_ProA felt they were accurate. The clients for both projects stressed the need for an open and transparent relationship, necessary to avoid target costs being set too high.

Conclusions and recommendations

Overall projects A and B felt that most partnering projects were successful, but not all. Opinions on the measures of success varied between parties and clients. Project A having a focus on cost whilst Project B on quality. What represents success to one

client would not equal success to the other. Incentivisation places a focus on cost and this can have a detrimental effect on the other aspects of a partnering project. This is slightly different to the opinions of some publications (CIRIA, 2001). The measurement of success should therefore reflect the objectives of the client and be specific for the project. One incentive scheme will not suit every project and will require adaptation.

There are many issues associated with incentivisation. The timing of the setting of the target cost is a problem on both projects with reluctance by contractors to set it early in the process, but the clients wishing to set it as early as possible. Project B did not judge partnering a complete success primarily because the target cost was not set early enough placing most risk upon the client. Although the client and contractors in Project A have been worked as partners for 16 years, they still complain that the target costs are inaccurate, which is not in line with Badenfelt's (2007) work.

The level at which to set the percentage for gain share is a divisive issue but a substantial majority of respondents disagreed with the 15 per cent suggested by Egan (1998). Incentivisation does not of itself appear to be the key to success and a level of 15 per cent would not generally satisfy either party. The contractor generally wanted a larger percentage than 15 per cent and the clients wanted it lower, in some cases as low as 5 per cent, as the client wishes to save money and the contractor wishes to make money. However Cli_ProB was happy for the pain/gain share to be 50 per cent. The focus of the project however was on quality and then time rather than cost. However, in both projects the gain share/pain share was set by the client and not in joint agreement, as suggested by Al-Harbi (1998).

The views on what factors were important in an effective incentive scheme depended largely on their experience in previous projects and therefore on the type of project they are involved in and the type of partnering. Therefore for Project B they felt working with the correct contractor and having advanced designs were essential. Project A suffers from a lack of trust and communication between the partners and the incentivisation did not improve this situation, which is different to the findings of Kadefors (2005).

Project A has contractors that are unhappy with the uneven pain/gain share. Both the clients and the contractors emphasised the need for a "fair" incentive scheme. Das and Teng (2001) also discuss how equity is important in the relationship and Egan (1998) discusses how every member of the partnership should make a fair and reasonable return.

Since a pain share/gain share of 15 per cent does not satisfy the contractor or the client, further research is suggested on the level of incentivisation that is ideal for a cost focused infrastructure project.

So in final conclusion, the hypothesis, the use of incentivisation is a precursor to the achievement of successful partnered projects within infrastructure projects in South Wales and whether the level that the gain/pain share is set at is significant for achieving a successful project, was not substantiated. However it highlighted the importance of agreement in the pain share/gain share and that setting the target cost can impact on trust within the partnering project.

References

- Al-Harbi, K. (1998), "Sharing fractions in cost-plus-incentive-fee contracts", *International Journal of Project Management*, Vol. 16 No. 2, pp. 73-80.

- Badenfelt, U. (2007), "The selection of sharing ratios in target cost contracts", *Engineering, Construction and Architectural Management*, Vol. 15 No. 1, pp. 54-65.
- Bayliss, R., Cheung, S., Suen, H. and Wong, S. (2004), "Effective partnering tools in construction: a case study on MTRC TKE contract 604 in Hong Kong", *International Journal of Project Management*, Vol. 22, pp. 253-63.
- Black, C., Akintoye, A. and Fitzgerald, E. (2000), "An analysis of success factors and benefits of partnering in construction", *International Journal of Project Management*, Vol. 18, pp. 423-34.
- Bresnen, M. and Marshall, N. (2000), "Motivation, commitment and the use of incentives in partnerships and alliances", *Construction Management and Economics*, Vol. 18, pp. 587-98.
- Broome, J. and Perry, J. (2002), "How practitioners set share fractions in target cost contracts", *International Journal of Project Management*, Vol. 20, pp. 59-66.
- Cheung, F., Rowlinson, S., Jefferies, M. and Lau, E. (2005), "Relationship contracting in Australia", *Journal of Construction Procurement*, Vol. 11 No. 2, pp. 123-35.
- Cheung, S., Ng, T.S., Wong, S. and Suen, H.C. (2003), "Behavioural aspects in construction partnering", *International Journal of Project Management*, Vol. 21, pp. 333-43.
- CIRIA (2001), *Construction Contract Incentivisation Schemes: Lessons from Experience*, CIRIA, London.
- Das, T. and Teng, B. (2001), "A risk perception model of alliance structuring", *Journal of International Management*, Vol. 7, pp. 1-29.
- Egan, J. (1998), "Rethinking construction", Department of the Environment, Transport and Regions, London, available at: www.construction.detr.gov.uk/cis/rethink/ (accessed 14 July 2008).
- Egan, J. (2008), "I'd give construction about four out of ten", Building Research Establishment, Watford, available at: www.bre.co.uk/filelibrary/CLIP/SirJohnEgan21-05-08.pdf (accessed 15 June 2008).
- Eriksson, P. and Laan, A. (2007), "Procurement effects on trust and control in client-contractor relationships", *Engineering, Construction and Architectural Management*, Vol. 14 No. 4, pp. 387-99.
- Eriksson, P., Dickinson, M. and Kalfan, M. (2007), "The influence of partnering and procurement on subcontractor involvement and innovation", *Facilities*, Vol. 25 Nos 5/6, pp. 203-14.
- Espling, U. and Olsson, U. (2004), "Part II. Partnering in a railway infrastructure maintenance contract: a case study", *Journal of Quality in Maintenance Engineering*, Vol. 10 No. 4, pp. 248-53.
- Hughes, D. (2010), "Collaboration: what is it and can it be measured?", Research Progress Report, Glamorgan University, Trefforest.
- Kadefors, A. (2005), "Trust in construction: cognitive traps as obstacles to collaborative contracting strategies", *Journal of Construction Procurement*, Vol. 11 No. 2, pp. 112-22.
- Latham, M. (1994), *Constructing the Team*, HMSO, London.
- Milne, P. (2007), "Motivation, incentives and organisational culture", *Journal of Knowledge Management*, Vol. 11 No. 6, pp. 28-38.
- Mohd-Sanusi, Z. and Mohd-Iskandar, T. (2007), "Audit judgement performance: assessing the effect of performance incentives, effort and task complexity", *Managerial Auditing Journal*, Vol. 22 No. 1, pp. 34-52.
- Naoum, S. (2003), "An overview into the concept of partnering", *International Journal of Project Management*, Vol. 21, pp. 71-6.

Saad, M., Jones, M. and James, P. (2002), "A review of the progress towards the adoption of supply chain management (SCM) relationships in construction", *European Journal of Purchasing and Supply Management*, Vol. 8, pp. 173-83.

Sappington, D. (1991), "Incentives in principal-agent relationships", *Journal of Economic Perspectives*, Vol. 5 No. 2, pp. 45-66.

About the authors

Deborah Hughes is a PhD student researching the effective use of incentives within collaborative arrangements, and holds the following qualifications: BA, BSc Hons, PGCE, MPhil, MSc. Deborah Hughes is the corresponding author and can be contacted at: 04137663@glam.ac.uk

Trefor Williams is Head of the Built Environment Division at the University of Glamorgan, and holds the following qualifications: BSc, PGCE, MPhil, FRICS, MCIQB, FBEng, MCQI, FHEA.

Zhaomin Ren is Reader at the University of Glamorgan, and holds the following qualifications: BSc Hydraulic Power and Engineering, MSc Construction Engineering and Management, PhD Construction Management, FCIQB.