

USE OF INCENTIVE IN CONSTRUCTION: CARROT OR STICK

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The use of incentive schemes is very common in construction projects. Primarily, construction incentivization arrangements are either positive reward (incentive) or penal (disincentive) in nature. This research aims to investigate under what circumstances incentive or disincentive should be used. Review of literatures on incentivization and theories of motivation suggest that: i) disincentives are useful for projects with well-defined budget and design; ii) incentives should be used to balance hidden risks; iii) incentives should be used to enhance relationship when the projects involved many team members; iv) disincentives are useful for building works; and v) incentives are useful for civil and infrastructural projects. Respectively, five scenarios were prepared to solicit views of practicing construction professionals. In general, all the suggestions were agreed by the respondents. The findings of the study inform how incentive schemes can be arranged to derive maximum benefits according to the project particulars. The study is useful to both researchers and practitioners.

Keywords: Incentive scheme, Theory of motivation, Construction projects, Degree of risks.

1 INTRODUCTION

Incentive schemes are widely used in the construction industry to motivate contractors to collaborate, align objectives, and improve performance (Bower *et al.* 2002, Chang 2014). If applied correctly, incentive schemes can focus both the client and the contractor on their appropriate work objectives, ensuring project success. Undoubtedly, the effective use of incentive schemes is indeed a silver bullet for construction management. Incentive schemes can be positive (incentive hereafter) or negative (disincentive hereafter). The incentive works as a reward for extra effort beyond scope and standard. In contrast, disincentive works as a penalty to punish works that are not up to standard and requirement (Bubshait 2003, Meng and Gallagher 2012).

The principles of incentivization have been well documented. There are many factors that affect the design and implementation of incentive schemes. The arrangement of incentive schemes should suit the nature and align with the expectations of the project. Otherwise, its use will be undermined. Structuring an effective incentive program can be a complex undertaking. Under this circumstance, consideration must be given to match different types of projects with the appropriate incentive schemes. It is a critical decision for construction clients. This study considers the roles of incentive schemes with respect to the characteristics of the projects. Five

scenarios and hypotheses are developed to investigate whether incentive or disincentive should be used with respect to different types of project.

2 INFLUENCE FACTORS AND HYPOTHESIS DEVELOPMENT

2.1 Budget and Design

Budget and design are the two most fundamental elements of construction projects (Williams 2016). The contractor has to carry out the work according to the design within the client's budget. With a well-defined budget and design, the standards and requirements can be clearly provided to the contractor, the cost can be well calculated, and the hidden risks to be borne by the contractor is not significant. What the client expects is that the contractor's works conform to specified standards and requirements. If the budget and design are sufficiently developed, the client will be reluctant to spend extra money and resources to 'reward' the contractor. Therefore, the use of incentives is not likely in the client's consideration. Based on this argument, the first hypothesis is:

H1 Disincentives are useful for project with well-defined budget and design.

2.2 Degree of Risks

Risks exist in every construction project. Risks can be broadly classified into two types, apparent and hidden (Tah and Carr 2001). Apparent risks can be identified by the contracting parties and typically allocate through the contract mechanism. However, the situation is different for hidden risks. In fact, both the client and the contractor are not keen to handle hidden risks because such risks are primarily related to the risks of cost and schedule, which can even inflict losses. To address this, incentive can be one way to balance the burden of risk management between both parties when the effect of hidden risk is significant. For example, clients can provide incentives like monetary rewards to the contractor to appreciate his effort in taking on the hidden risks. Based on this argument, the second hypothesis is:

H2 Incentives should be used to balance hidden risks.

2.3 Size of Project Team

Construction project team members are usually assembled through a complex contractual network. Even though these parties are working on the same project, they may have different objectives. For example, the objective of the consultant is to help the client to monitor the project. However, the contractor's objective is to maximize his profit. Relationships in the construction industry are often adversarial, thus easily lead to conflicts or disputes, which will increase time and costs correspondingly. This problem is more significant for large-scale projects with a very huge number of project team members. In extreme cases, they may not even work together.

To alleviate this problem, relationship investment is suggested. As improving the relationship and aligning objectives are not the basic requirements, a disincentive is not suitable in this case. The client cannot use punishment to force the contractor to provide extra efforts. Incentive can be introduced as the vehicle to motivate the project team members to improve the relationship and compensate for their respective efforts. Moreover, the incentive should not be limited to money but can be other means, such as extra time and future work opportunities. For projects with a large number of team members, relationship investment becomes especially important because of high interdependency among them. The third hypothesis therefore is:

H3 Incentives should be used to enhance relationship when the project involved many team members.

2.4 Project Sector and Nature

Construction projects of different nature, such as building works, maintenance works, and civil works, have varying characteristics. Thus, no single incentive scheme can be used for projects of different nature. For building works, the construction is usually carried out inside the construction site, the size is usually not large, and the duration is relatively short. Thus, the risks and uncertainties of building works are usually controllable. The extent of design changes during the construction stage will not be significant and the contractor only needs to comply with the requirements provided by the client. Obviously, disincentive can be introduced as a deterrent to prevent the contractor from failing the terms of the contract. Moreover, for most of the building works, the client is usually from the private sector. The certainty of expenses is paramount; the client is not likely to put in extra investment for incentive. Accordingly, the fourth hypothesis is:

H4 Disincentives are useful for building works.

For civil and infrastructure projects, it is quite different from building works. First, the construction site is much larger, sometimes can even cross for several numbers of districts. The effect of external factors is more significant, and it is almost impossible for the design team to obtain all valid site information. Second, the duration of civil and infrastructure projects are much longer, and the hidden risks are substantial. Third, this kind of project is unique, usually not easy to find similar projects for comparison. With all the above-mentioned characteristics, civil and infrastructure projects are facing more risks and uncertainties in general. Therefore, it is advisable to use incentive to compensate risk management costs and encourage more innovations.

Furthermore, the employers of civil and infrastructure projects are mainly from the public sector. Their priority is not project profitability. Clients are willing to spend extra resources as an incentive to ensure the quality and safety of projects. Due to the nature of civil and infrastructure projects, it is advisable to incorporate incentives. Based on this argument, the fifth hypothesis is:

H5 Incentives are useful for civil and infrastructure projects.

3 SCENARIO DESIGN AND QUESTIONNAIRE DESIGN

3.1 Scenario Design

Since there are five suggested hypotheses, five corresponding scenarios with respective questions are used to test the hypotheses.

Scenario 1: A developer in Hong Kong decided to start a residential development, which comprises five 60-story residential blocks and a clubhouse. This developer spent a lot to appoint a design and consultant team, which has rich experience in a residential project. After the completion of the design, the construction works are awarded to a local contractor.

Scenario 2: The landlord decided to build two more residential blocks in Estate A of Hong Kong. The designated site is a sloped site, which is near to the coastline and adjacent buildings. Moreover, to shorten the construction period, the landlord appointed design and build contractor to carry out the work.

Scenario 3: A United States developer started a project in Hong Kong with a 120-story skyscraper in a newly developed district. Alliancing project delivery will be used. The construction works will be awarded to a local contractor and the design works will be carried out by the developer's own design team in the US. The project is large in scale and high in complexity. Extensive teamwork among the parties is expected.

Scenario 4: A landlord owned a low-rise residential building in an old district, which was built in the 1950s. They have decided to demolish the whole building for redevelopment. The site will be used to build a medium-size composite building.

Scenario 5: The government started to construct an underground tunnel to relieve traffic congestion in the oldest district. The project comprised a 3 km long dual lane trunk road across the center point of the district. The project is high in complexity as the vicinity of the tunnel has many buildings built in the 1950s. The government decided to contract the construction work to an international construction company with headquarter in the United Kingdom; this company has rich experience in underground tunnel construction.

3.2 Data Collection

The content of the questionnaire is based on the scenario illustrated above. The respondents will be given five incentive schemes, which include both incentive and disincentive.

Question 1. Year of experience in construction industry

This question is used to collect the personal information of the respondents.

Question 2-6. Scenario-type question

Based on the 5 scenarios, the respondents will be asked to score the effect of each incentive scheme on project performance. 1 means that the incentive scheme has no effect on project performance and 7 means the incentive scheme has the most effect on project performance. The 5 incentive schemes provided to the respondents are as below:

- Saving sharing scheme: The contractor and the client share the saving in construction cost due to the improvement in project performance.
- Penalty on non-compliance to standard and requirement: The client can penalize the contractor by fining forfeiture if any non-compliance is found.
- Risk-sharing scheme: The contractor can claim part of the hidden risk management cost.
- Offering future job opportunity: For a similar scope of work, the contractor can have higher preference.
- Relationship investment: Client provides extra schedule, venue, and coordination for team building other than regular meetings.

Questionnaires were sent out to construction practitioners who were familiar with cost management and incentivization. Finally, 55 questionnaires were collected. Among these, above 85% of the respondents have more than 5 years of work experience, which can ensure that they have proper knowledge and experience regarding to construction industry and incentivization.

4 HYPOTHESES TESTING

Two parameters are used to evaluate the usefulness of the incentive scheme. The first is the mean score should be higher than 4.5. This parameter aims to prove the effectiveness of that incentive scheme is significant. The second is the percentage chosen for higher than or equal to 5 should be larger than 50%. This parameter aims to prove the result is supported by the mainstream.

According to the data analysis, four out of five hypotheses are well supported except H2. Refer to the five incentive schemes, only “penalty on non-compliance to standards and requirements” is disincentive. In H1 (a project with well-defined budget and design) and H4 (building works), this disincentive is the respondents’ first choice. H1 and H4 are well proved. The incentive scheme corresponding to H3 (a project with large team members) and H5 (a civil and infrastructure project) is “relationship investment,” which is incentive. H3 and H5 are also well proved. For H2 (a project with substantial hidden risks), the most relevant incentive that addresses hidden risks should be “risk-sharing scheme.” However, the result shows that “risk-

sharing scheme” only ranked as number two and “penalty on non-compliance to standards and requirements” is the respondents’ first choice. Although “risk sharing scheme” is not the choice with highest mean score, the usefulness of this scheme has still been agreed by more than half of the respondents, so we consider H2 is partially proved by the test.

5 DISCUSSION

5.1 Extensive Use of Disincentives

The rankings of “penalty on non-compliance to standards and requirements” in the five scenarios are 1, 1, 2, 1, and 5, respectively. This reflects that the client prefers to use disincentive most of the time. Loss averse can be used to explain this phenomenon (Tom *et al.* 2007). It suggests that the subjective weight of a penalty is larger than that of a reward, which proves disincentive has greater power over behavior modification, and thus more suitable to be used to restrain the contractor’s behavior, secure base standards and requirements (Tversky and Kahneman 1991). Furthermore, the incorporation of incentives requires extra resources since the client needs to provide rewards to the contractor. Comparing the two types of incentive scheme, undoubtedly, clients prefer using disincentive as its ease of use and apparent efficiency and economy. The ranking of disincentive is high in the first four scenarios, in which the clients are from the private sector. Nevertheless, the ranking of disincentive is the lowest in scenario 5, where the clients are from the public sector. From the public sector’s perspective, their target users are the general public, so the client will more emphasize on project quality and safety instead of profitability. Disincentive is usually not their first choice.

5.2 Future Job Opportunities

The rankings of “relationship investment” in the five scenarios are 2, 3, 3, 2, and 2, respectively. The rankings reflect that the effect of offering future job opportunities to motivate extra efforts is relatively high. The reason may well be the fact that construction in Hong Kong is a buyers’ market. Contractors who want to maintain their market share must look for all forms of job opportunities. Under this circumstance, the effect of offering future job opportunities is self-evident. Furthermore, offering future job opportunities is an economical option from the clients’ perspective. Reaching a consensus with the contractor about the higher priority and opportunity in their future projects is not difficult for the client. They do not need to spend actual resources. Also, it is beneficial for the ongoing project because the initial trust can be built; the contractor will perform well with the aim of maintaining a long-term relationship.

5.3 Saving Sharing Attitude

The rankings of the “saving sharing” are 4, 5, 5, 3, and 3, respectively. The data shows that “saving sharing” scheme is not an effective incentive for the client in most situations. For the “saving sharing” scheme, it is understandable theoretically but not easy to implement in practice. With a highly competitive bidding environment in Hong Kong, to win a project, the contractor usually has already made many concessions in the bid built-up. Thus, not much cost saving can be achieved. In addition, not all types of construction contracts are suitable to use the “saving sharing” scheme. For example, in a fixed-price contract, the risk of cost management is allocated to the contractor, his motive to save construction costs is already there and the saved cost should all belong to the contractor. In the case of cost-reimbursable contracts, the contractor takes no direct cost risk. There is no motive for the contractor to save. Only when the project applies target cost contracts, the “saving sharing” scheme can play a role, and the saved cost should be

divided between client and contractor. However, even in a target cost contract, the “saving sharing” scheme should be used carefully with an executable plan and provision.

5.4 Risk Sharing Attitude in Private Sector

The ranking of “risk-sharing” in the private sector scenarios are 5, 2, 4, and 5, respectively. As this finding focuses on private sector projects, the ranking of scenario 5 is excluded. The data shows that “risk-sharing” is considered as the least effective incentive scheme by the private sector. The risk attitude of client may contribute to this finding. In fact, both the client and contractor are typically risk-averse. How to allocate risks between the client and the contractor is always a pivotal issue in the construction industry (Chang 2014). The client usually has many stronger bargaining powers in the early stage of the project and they usually shift as much risks as possible to the contractor. There is no right or wrong for the client’s decision on risk allocation. However, this attitude is not advisable because it may undermine the relationship between the parties and negatively influence project outcomes. As in the scenario 2, if the contractor is seriously affected by the hidden risks, his profit margin will be greatly reduced. The contractor may sacrifice the quality of works and the client will also suffer at the same time. Therefore, it is suggested that client from the private sector can spend some resources on risk-sharing scheme to ensure the project performance.

6 CONCLUSION

Construction projects with different characteristics are facing different levels of risk and uncertainty. Incentive is one of the means to motivate contractors to handle these challenges. Unfortunately, the current use of incentive is not significant, especially in the private sector. The principal reason is that clients do not want to spend extra resources to incentivize contractors. Nonetheless, to use incentive schemes in an appropriate way, consideration must be given to aligning incentive schemes with project characteristics. The designer should have a more thorough understanding of projects’ factors and natures, which will affect the effectiveness and choice of incentive schemes. In this study, five hypotheses derived from five case scenarios representing five different project characteristics are supported in general by the respondents.

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